CLERK'S COPY.

Vol. VIII

TRANSCRIPT OF RECORD

BOOK OF EXHIBITS

Supreme Court of the United States

OCTOBER TERM, 1940

No. 267

SIX COMPANIES OF CALIFORNIA, HARTFORD ACCIDENT AND INDEMNITY COMPANY, ET AL., PETITIONERS,

vs.

JOINT HIGHWAY DISTRICT No. 13 OF THE STATE OF CALIFORNIA

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT

PETITION FOR CERTIORARI FILED JULY 22, 1940.

CERTIORARI GRANTED OCTOBER 14, 1940.

NO. 9113

United States

Circuit Court of Appeals

For the Ninth Circuit.

SIX COMPANIES OF CALIFORNIA, a corporation, and HARTFORD ACCIDENT AND INDEMNITY COMPANY, a corporation, FIDELITY AND DEPOSIT COMPANY OF MARYLAND, a corporation, THE AETNA CASUALTY AND SURETY COMPANY, a corporation, INDEMNITY INSURANCE COMPANY OF NORTH AMERICA, a corporation, AMERICAN SURETY COMPANY OF NEW YORK, a corporation, MARYLAND CASUALTY COMPANY, a corporation, UNITED STATES FIDELITY AND GUARANTY COMPANY, a corporation, THE FIDELITY AND CASUALTY COMPANY OF NEW YORK, a corporation, GLENS FALLS INDEMNITY COMPANY, a corporation, STANDARD SURETY AND CASUALTY COMPANY OF NEW YORK, a corporation, STANDARD ACCIDENT INSURANCE COMPANY, a corporation, MASSACHUSETTS BONDING AND INSURANCE COMPANY, a corporation, CONTINENTAL CASUALTY COMPANY, a corporation, and NEW AMSTERDAM CASUALTY COMPANY, a corporation,

Appellants,

vs.

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA, a public corporation,

Appellee.

Transcript of Record

In Eight Volumes

VOLUME VIII

Book of Exhibits

Upon Appeal from the District Court of the United States for the Northern District of California, Southern Division.

PARKER PRINTING COMPANY, 545 SANSOME STREET, SAN FRANCISCO

[CLERK'S NOTE: Excerpt from stipulation of counsel re portions of record to be printed:

"(1) It is stipulated that an agreed statement of facts in the form hereto attached and marked Exhibit 'A' shall be printed in the record in lieu of plaintiff's exhibits numbers 1, 5, 6, 8, 9, 11, 12, 13, 14, 15, 17, 19, 20 and 21."]

EXHIBIT "A"

AGREED STATEMENT OF FACTS

Defendant, by resolution of its Board of Directors, adopted on March 3, 1933, duly and regularly approved the final surveys, plans and specifications and detailed drawings and final estimate of cost of the project which it proposed to construct. Said specifications, plans and drawings so approved were the same as plaintiff's Exhibits Nos. 3 and 2, respectively, introduced in evidence herein. Said estimate of cost was the same as plaintiff's Exhibit No. 4.

Thereafter, by resolution of its Board of Directors, adopted January 9, 1934, defendant duly and regularly approved the first amendment to said specifications, plaintiff's Exhibit No. 7 herein, and thereafter, by resolution of its Board of Directors, adopted April 3, 1934, defendant duly and regularly approved the second amendment to said specifications, plaintiff's Exhibit No. 10 herein.

All of said specifications and amendments thereto and said plans, surveys, detailed drawings and esti-

mate of cost were duly and regularly approved by the Director of the Department of Public Works of the State of California.

On May 4, 1934, the Board of Directors of defendant adopted a resolution to proceed with the construction of the project of defendant and directing that a notice to contractors be published that sealed bids for the construction of defendant's project would be received until May 22, 1934.

Thereafter, said notice was duly and regularly published.

On May 22, 1934, plaintiff submitted to defendant a bid for constructing said project of defendant. Said bid was in the amounts set forth in the contract thereafter entered into between plaintiff and defendant, plaintiff's Exhibit No. 16 herein, and was the lowest and best bid submitted.

On May 29, 1934, the Board of Directors of defendant adopted a resolution accepting said bid of plaintiff and awarding to it a contract for the construction of said project of defendant and authorizing the execution of said contract.

Said contract was thereafter duly and regularly executed by the parties thereto.

Thereafter, a bond for faithful performance of the contract and a bond for the payment of materialmen and laborers were duly and regularly filed by plaintiff with defendant. Both bonds were dated June 12, 1934, and both were duly and regularly approved by a resolution of the Board of Directors of defendant, adopted June 14, 1934.

Attached to the cross-complaint herein is a full, true and correct copy of said bond for faithful performance, which is plaintiff's Exhibit No. 18.

Defendant is, and at all times which are material to this case, has been, a duly and regularly organized and existing public corporation under the law of the State of California. Prior to entering into said contract with plaintiff, defendant duly and regularly complied with all the requirements of the laws of the State of California relating to its organization, the construction of its project and the awarding of said contract to plaintiff for the construction thereof.

PLAINTIFF'S EXHIBIT No. 3

Specification No. One
Set No. 99

JOINT HIGHWAY DISTRICT No. 13
OF THE STATE OF CALIFORNIA

office of

Wallace B. Boggs, District Engineer,
1448 Webster Street
Oakland, California

Dated March 30, 1933

SPECIFICATIONS

For the Construction of a Highway Tunnel and Roadway Approaches from Broadway and Keith Avenue in Oakland to a Point on the State Highway in Contra Costa County, Approximately Fourteen Hundred Feet (1,400') Northerly from the Fish Ranch Road; Being Partly in the City of Oakland, County of Alameda, and Partly in the County of Contra Costa, and All in Joint Highway District No. 13 of the State of California.

SECTION 1. WORK TO BE DONE

The work to be done shall consist of the construction of a highway tunnel with ventilation buildings, ventilation equipment and accessories; the construction of roadway approaches with pavements, drainage structures, curbs, gutters and sidewalks where required; the construction of grade separation

structures, viaducts, retaining walls and incidental structures; connections with existing streets, highways and structures, the furnishing of all labor, material, tools and equipment and the performance of all work necessary or incidental to the construction detailed, specified and intended, and that may be necessary to perform the complete construction as shown on the plans accompanying these specifications and made a part hereof, or as specified herein, being partly in the City of Oakland, County of Alameda, and partly in Contra Costa County, State of California, and all in Joint Highway District No. 13 of the State of California.

SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS

(a) Proposal Forms.—Prospective bidders will, upon request to the District Engineer, 1448 Webster Street, Oakland, California, be furnished with Proposal Forms which will state the location and description of the contemplated construction and contain a schedule of items for which bid prices are asked, all proposals and bids to be submitted on the forms supplied by the District.

(b) Estimates of Quantities.—Where estimates of quantities are given on the Proposal Form, or in "Notice to Contractors," or in any Contract executed hereunder, it is hereby declared and shall be understood that such quantities are approximate only, being given as a basis for comparison of bids. The District does not expressly or by implication agree or

guarantee that the actual amount of work will correspond therewith, but reserves the right to increase or decrease the amount of any class or portion of the work, or to omit portions of the work as may be deemed necessary or expedient by the District Engineer.

(c) Examination of Plans, Specifications and Site of Work.—The bidder is required to examine carefully the site of the work, the Proposal Form, and plans, specifications and contract forms for the work contemplated. The submission of a Proposal shall be considered prima facie evidence that the bidder has made such an examination and is satisfied as to the conditions to be encountered, as to the character, quality and quantities of work to be performed and materials to be furnished, and as to the requirements of the specifications, plans and contract, or contracts.

* * * * * * * *

(i) Competency of Bidders.—Any bidder, if required by the Board of Directors, shall furnish a statement as to his ability to perform the work contemplated, and the Board of Directors reserves the right to reject the proposal of any bidder who, in their opinion, fails to show that he has the necessary capital, financial standing, organization, facilities, experience and ability to begin the work promptly and perform and complete the work to be done under the contract in a satisfactory manner.

SECTION 3. AWARD AND EXECUTION OF CONTRACT

(a) Acceptance or Rejection of Proposals.—The Board of Directors reserves the right to reject any and all proposals.

(b) Award of Contract.—The award of the contract, if one be awarded, will be to the responsible bidder whose proposal is the lowest regular acceptable bid and complies with all the requirements prescribed by law and these specifications.

(c) Bonds.—The Contractor to whom an award is made shall, in addition to the execution of the contract in a form approved by the attorney for the District, within twenty (20) days after the date of the award of such contract by the Board of Directors, execute and deliver to the District bonds for the faithful performance of the contract and for the payment of all claims for labor and material thereunder in the manner provided by law and in the form approved by the attorney for the District. Said bonds shall be executed by the bidder with a corporate surety or sureties duly authorized to do business as such under the law of the State of California and each in amounts which shall be not less than fifty per cent (50%) of the aggregate contract price.

(d) Execution of Contract.—Contracts shall be executed in a form approved by the attorney of the District and delivered to the District within twenty (20) days after the date of the award of such contract by the Board of Directors. No proposal shall

be considered binding upon the District until the execution of the contract and bonds as hereinbefore provided.

(e) Failure to Execute Contract.—Any bidder who fails to execute a contract and file acceptable bonds as provided herein within twenty (20) days after the date of the award of such contract by the Board of Directors shall be subject to having his bid annulled, and his certified bid check forfeited to the District as liquidated damages. In such event, awards may then be made to the next lowest responsible and acceptable bidder, or the District may call for new bids, as the Board of Directors thereof may determine.

SECTION 4. TIME

(a) Commencement of Work.—The Contractor shall commence work within ten (10) days after the execution of the contract for the work by the Board of Directors and shall continue without interruption unless otherwise directed by the District. At least three (3) days before starting, the Contractor shall notify the District Engineer in writing of the date that work is to commence.

(b) Completion of Work.—The time of completion of the entire work specified herein shall be within a period of seven hundred and twenty (720) calendar days from the date of the execution of the contract by the Board of Directors.

(c) Extension of Time.—The time during which the Contractor is delayed in said work by Acts of

God, or by stormy or inclement weather, or by any reason which, in the judgment of the District Engineer, unavoidably delays the work, shall be added to the aforesaid time for completion, provided that the Board of Directors approve in advance the written application therefor, which must be made by the Contractor for such an extension, before the expiration of the time limit fixed herein, or a duly granted extension thereof.

(d) Damages for Delay.—The parties hereto expressly stipulate and agree that time is the essence of this contract. In case the work is not completed within the time specified in the contract or within such extensions of the contract time as may be allowed as herein provided, it is distinctly understood and agreed that the Contractor shall pay the District as agreed and liquidated damages and not as a penalty five hundred dollars ($500.00) for each and every working day which may elapse between the limiting date as herein provided and the date of actual completion of the work, said sum being specifically agreed upon as a measure of damage to the District by reason of delay in the completion of the work; it being expressly stipulated and agreed that it would be impracticable to estimate and ascertain the actual damages sustained by the District under such circumstances; and the Contractor agrees and consents that the amount of such liquidated damages so fixed, shall be deducted and retained by the District from any money then due, or thereafter to become due, the Contractor.

[Clerk's Note: As amended by Plaintiff's Exhibit No. 10]

SECOND AMENDMENT AND SUPPLEMENT TO FINAL SPECIFICATIONS FOR CONSTRUCTION OF PROJECT

SECTION 5. PAYMENTS

(a) Partial Payments.—Payments will be made only upon the certificate of the District Engineer for work actually performed. The District Engineer shall measure the work on or about the first day of each month and at the time of completion of the entire work, and shall render a certificate on or about the tenth day of each month and at the completion of the entire work, stating the amount of work performed during the previous calendar month and during the current month at the time of completion. The Contractor shall then, at the times above specified, be entitled to receive a payment from the District in an amount to be determined as follows: Until the total value of the work done since commencement of performance of the contract exceeds Four Hundred Thousand Dollars ($400,000.00) the payment will be seventy-five per cent (75%) of the amount specified in the District Engineer's certificate; thereafter and until the total value of the work done since the commencement of performance of the contract equals One Million Dollars ($1,000,000.00), the constant sum of One Hundred Thousand Dollars ($100,000.00) will be retained by the District out

of said total value; thereafter the progress payment will be ninety per cent (90%) of the amount specified in the Engineer's certificate, provided that no such estimate of payment shall be required to be made when, in the judgment of the District Engineer, the work is not proceeding in accordance with the provisions of the contract, or when, in his judgment, the total value of the work done since the last estimate amounts to less than Five Hundred Dollars ($500.00), except the certificate and payment required at the completion of the entire work.

The acceptance by the Contractor of the final ninety per cent (90%) payment for the completed work shall be and shall operate as a release to the District from all claims and liability to the Contractor for anything done or furnished for or relating to the work, or for any act or neglect of the District or its agent in any way affecting the work, excepting the claim of the Contractor against the District for the moneys herein provided to be paid by the District to the Contractor thirty-five (35) days after the acceptance of the contract.

(b) Final Payments.—Thirty-five (35) days after the acceptance of the work by a certificate of acceptance duly rendered by the District Engineer and final approval and acceptance by the Board of Directors of the District, the Contractor shall be entitled to receive a payment of the balance due under this contract in the amount of ten per cent (10%) of the aggregate amount of all certificates of the District Engineer.

SECTION 6. GENERAL PROVISIONS

(a) Definitions.—Whenever in these specifications, or in any documents or instruments in construction where these specifications govern, the following words or terms, or pronouns in place of them are used, they shall have the respective meaning and intent here given:

(1) District.—Refers to and indicates Joint Highway District No. 13 of the State of California.

(2) Board of Directors or Board.—Refers to and indicates the Board of Directors of Joint Highway District No. 13 of the State of California.

(3) District Engineer or Engineer.—Refers to and indicates the District Engineer of Joint Highway District No. 13 of the State of California, appointed by the Board of Directors of said District and acting either directly or through properly authorized agents. Such agents acting within the scope of the particular duties entrusted to them.

(4) Contractor.—Refers to and indicates the person or persons, copartnership or corporation, or association who have entered into a contract with Joint Highway District No. 13 of the State of California to perform the work to be done in accordance with these specifications, or their legal representatives.

(5) Bidder.—Refers to and indicates the person or persons, copartnership or corporation, or association submitting a proposal for the work contemplated, acting directly or through duly authorized representatives.

(6) Surety or Bondsmen.—Refers to and indicates the corporate body which is bound with and for the Contractor for the faithful performance of the contract and for the completion of the work, and for the payment of all claims for labor or materials thereunder, in the manner provided by law.

(7) Specifications.—Refers to, indicates and includes all specifications, provisions, directions and requirements of every kind, whether general, detailed or otherwise, relating to the equipment, materials, or work and the installation thereof; and the plans and drawings, or exact reproductions thereof accompanying and supplementing the same, which are made a part thereof.

(8) Plans.—Refers to, indicates, and includes the official plans, profiles, general and typical cross-sections and details, or the exact reproductions thereof, approved by the District Engineer, which show the location, character, dimensions and details of the work to be done and which

accompany and are supplementary to the specifications and are made a part thereof.

(9) Contract.—Refers to, indicates and includes the written agreement entered into by the Contractor and the District, covering the performance of the work and the furnishing of labor, materials and equipment in the construction of the work. The Contract shall include the Notice to Contractors, the proposal, plans, specifications and contract bonds.

(10) Contract Bond or Bonds.—Refers to, indicates and includes the approved form of security furnished by the Contractor and his surety as a guaranty that he or they will complete the work in accordance with the terms of the contract, and to secure the payment of claims for materials provisions, provender or other supplies or equipment, used in, upon, for or about the performance of the work, or for any work or labor thereon.

(11) The Work.—Refers to, indicates, and includes all the work specified or indicated by the plans and specifications for the contemplated improvement covered by the contract.

(12) As Directed, etc.—Whenever the words "as directed," "as required," " as permitted," or words of like effect or intent are used, it shall be understood that the

direction, requirement or permission of the District Engineer is intended. The words "sufficient," "necessary" or "proper" or words of like import, shall mean sufficient, necessary or proper in the judgment of the District Engineer. The words "approved," "acceptable," "satisfactory," or words of like import, shall mean approved by, acceptable to, or satisfactory to the District Engineer.

(b) Authority of District Engineer.—The District Engineer shall decide any and all questions which may arise as to the quality or acceptability of materials furnished and work performed and as to the manner of performance and rate of progress of the work, and shall decide all questions which may arise as to the interpretation of the plans and specifications, and all questions as to the acceptable fulfillment of the contract on the part of the Contractor and as to compensation. His decisions shall be final and he shall have executive authority to enforce and make effective such decisions and orders as the Contractor fails promptly to carry out.

(c) Compliance with Specifications.—It shall be the duty of the Contractor to see that the provisions of these specifications are complied with in detail, irrespective of the inspection of the work during its progress by the District Engineer or his representatives.

(d) Inspection.—The Contractor shall afford every facility necessary for the safe and convenient

inspection of the work throughout its construction and for inspection of materials used or to be used. The District Engineer shall have power to reject material and workmanship which are not in accordance with specifications, and all such must be removed promptly by the Contractor and replaced to the satisfaction of the District Engineer without extra expense to the District.

All inspection of materials shall be made after delivery at the site, unless the District Engineer shall direct otherwise. Material rejected at the place of manufacture or elsewhere shall not be delivered on the site of the work, and material rejected at the site of the work shall be removed from the site as soon as possible and not returned thereto.

The failure of the District Engineer or his representatives to discover and condemn work not in accordance with the specifications shall not relieve the Contractor of his obligation to the District to furnish proper materials and work as provided in these specifications; nor shall it relieve the Contractor from being compelled to remove and replace promptly any work found to be defective at any time during the construction of the work, or before the final acceptance of the work.

(e) Disputes.—To prevent disputes and litigation the District Engineer shall in all cases determine the amount, quality and acceptability of the work and materials which are to be paid for under these specifications. He shall determine all questions

in relation to said work and materials and performance thereof and all questions which may arise relative to the fulfillment or interpretation of these specifications on the part of the Contractor. His estimate and decision shall be final and conclusive, and in case any question shall arise between the Contractor and the District pertaining to the contract, the District Engineer's estimate and decision shall be a condition precedent to the right of the Contractor to receive any moneys under the contract.

(f) Contractor to Be On Work.—The Contractor shall be constantly on the work during its progress, either in person or represented by duly authorized representatives, who are competent to receive and carry out any instructions that may be given by the proper authorities, and said Contractor will be held liable for the faithful observance of any instructions which may be delivered to him or to his representatives on the work. The District Engineer shall be notified by the Contractor in writing as to the personnel of authorized representatives and all changes pertaining thereto.

The Contractor shall maintain an office on the site of the work and install and maintain a telephone connected with local and long distance telephone, all at his own expense.

(g) Alterations.—In case of reduction or increase in quantities of work, by reason of alterations or any cause whatsoever, the Contractor shall accept payment in full at the contract unit prices

for the actual quantities of work done and no allowance will be made for anticipated profits due to such reduction or increase.

(h) Interpretation of Plans and Specifications. —Should it appear that the work to be done or any matters relative thereto are not sufficiently detailed or explained in the plans and specifications, the Contractor shall apply to the District Engineer in writing for such further details and explanations as may be necessary, and he shall conform to the same as part of the contract insofar as they may be consistent with the original specifications and plans. In the event of any doubt or question regarding the true meaning of the specifications, the decision of the District Engineer shall be final. In the event of any discrepancy between any drawing and figures written thereon, figures shall be taken as correct.

Should the Contractor believe that any work ordered is not properly a part of his contract or according to the intent of these plans and specifications, he shall before commencing same notify the District Engineer in writing of his objection to same and shall not perform such work until notified in writing by the District Engineer as to his decision in the matter. The commencement of any such work shall act as a waiver by the Contractor of any objection he may have to the execution of such work, and as a waiver of any claim for extra work in consequence of such order.

These specifications and plans shall be considered as supplementary one to the other, so that ma-

terials and workmanship, indicated, called for, or necessarily implied by the one and not by the other, shall be supplied and placed in the work the same as though specifically called for by both.

(i) Compliance With Legislation.—The Contractor shall conform to all federal, State, County and Municipal laws, ordinances and regulations, which may apply to the work herein provided for, and during the progress thereof, and shall pay for licenses, fees and other charges levied or charged in accordance with such laws, ordinances or regulations, and no claim for extra payment shall be made to the District for such fee, license or charge, it being specifically understood that such licenses, fees or charges are covered by the unit prices bid.

(j) Royalties.—The Contractor shall pay all royalties or other charges that may arise due to methods, types of construction, processes, materials or use of equipment and shall hold the District harmless from any charges whatsoever which may arise, and shall furnish written assurance satisfactory to the Board of Directors that such charges have been paid, and the Contractor shall be liable for all such charges under the bonds furnished with said contract.

(k) Contractor's Liability.—On all work the Contractor is to assume all liability of every kind or nature, arising from said work, either from accident, negligence or any cause whatsoever during the progress of the work and before the final acceptance thereof, and shall indemnify and hold the

District harmless therefrom, and the bonds given by the Contractor shall hold and secure the said District free and harmless from any or all damage or expense whatsoever.

(l) Insurance.—The Contractor at his own expense shall effect and maintain such Liability and Workmen's Compensation Insurance as will protect him, the District and the District Engineer from claims under the Workmen's Compensation Acts and from any other claims for damages for personal injury, including death, which may arise from operations under the contract, whether such operations be by himself or by any subcontractor or by anyone employed directly or indirectly by either of them.

The Contractor shall also at his own expense provide insurance against loss by fire, payable to the District, to cover any and all structures or property belonging to or in possession of the District and placed at the Contractor's disposal in whole or in part, and also to cover all materials accepted but not placed in the work which have been included in the monthly estimates and which have been or are to be taken over by the District.

The Contractor shall, before commencing work on this contract, deliver to the District Engineer certificates from insurance companies or their agents stating that said insurances are in force and will not be cancelled without written notice to the District Engineer.

(m) Sub-letting and Assignment.—No subcontractor will be recognized as such and all persons engaged in the work of construction will be considered as employees of the Contractor and their work shall be subject to the provisions of the contract and specifications. Where a portion of the work which has been sublet by the Contractor is not prosecuted in a manner satisfactory to the District Engineer, the subcontractor shall be removed immediately on the order of the District Engineer and shall not be employed again upon the work.

Neither the contract nor any part thereof shall be assigned unless the Board of Directors first consents in writing to such assignment. Such assignment shall not relieve the Contractor or his bondsmen from any liability whatsoever.

(n) Contractor Guarantees Work.—It is understood that the Contractor is skilled in the trade or calling necessary to perform the work herein set forth and that the District, not being skilled in such matters, relies upon the Contractor to do and perform all work necessary, and to do, supply and furnish all the acts and things necessary, at the proper times and in the most skilful and desirable manner, and the Contractor guarantees the workmanship and materials furnished and supplied to be the best of their kind. The acceptance of any part or of the whole of the work does not operate to release the Contractor or his bondsmen from said guarantee.

(o) Dismissal of Workmen.—The District Engineer may, if he deem it necessary for the good of the work, require the Contractor to dismiss any workman on the work and such person shall not again be employed on the work.

(p) Sanitary Arrangements.—The Contractor shall make provision for and maintain in a sanitary manner at the work, all necessary and sanitary conveniences for the workmen in accordance with the rules and regulations of the Department of Public Health, or the Department of Industrial Relations, acting in conjunction with said Department of Public Health, and of all lawful authority.

(q) District May Perform Work.—(1) The Contractor agrees that if the work to be done under this contract shall be abandoned, or, if in the opinion of the Board of Directors the work or any part thereof is unnecessarily or unreasonably delayed, or if the same is not prosecuted with the diligence and force specified, meant and intended in and by the terms of the contract; or if the Contractor is wilfully violating any of the conditions or covenants of the contract and specifications or of the plans or of any part of the contract, or is executing the work in bad faith, the said Board of Directors shall then have the power to notify said Contractor to discontinue the work or any part thereof under the contract, and thereupon the Contractor shall cease to continue such work or such part thereof as the Board of Directors may designate.

(2) The said District shall thereupon have the power to place such or so many persons and to obtain by contract, purchase or hire such animals, equipment, tools, materials and labor as the District Engineer may deem necessary to work at and to be used to complete the work herein described, or such part thereof as the District Engineer may deem necessary; and to use such material as may be found upon the site of the work, and to procure other material for the completion of the work, and to charge the expense of such labor, material, animals, equipment, etc., to the Contractor, and the expense so charged shall be deducted and paid by the District out of such money as may be due or may at any time thereafter become due to the Contractor under and by virtue of this contract or any portion thereof.

(3) In case such expense is less than the sum which would have been payable under this contract at the unit prices bid, as calculated from the District Engineer's final estimate if the work had been completed by the Contractor, then the Contractor shall be entitled to receive the difference, but in case such expense shall exceed the last said amount then the Contractor and his bondsmen shall be jointly and severally liable to pay the amount of such excess to the District on notice by the District of the amount of excess so due.

(r) Temporary Suspension of Work.—The District Engineer shall have the authority to suspend the work wholly or in part for such period as he

may deem necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the work, or for such time as he may deem necessary due to the failure on the part of the Contractor to carry out orders given, or to perform any provision of the contract. The Contractor shall immediately respect the written order of the District Engineer to suspend the work wholly or in part. The work shall be resumed when conditions are favorable and methods are corrected, as ordered or approved in writing by the District Engineer.

(s) Lines and Grades.—The Contractor is to furnish free of charge all stakes necessary for marking and maintaining points and lines given by the District Engineer; and shall give the District Engineer such facilities and materials for giving said lines and points as he may require, and the District Engineer's marks must be carefully preserved.

Sufficient points to line and grade will be set for the Contractor to work to and no additional stakes will be set. Any such stakes or marks lost, damaged or obliterated shall be replaced at the expense of the Contractor.

The Contractor shall do his own engineering and shall be responsible for the completion of the work to proper lines and grades in conformance with the stakes set by the District Engineer.

The District Engineer shall be furnished facilities for the checking of lines, elevations, grades and forms at all times during the progress of the work.

The Contractor shall, without charge to the District, provide openings for and suspend work that will in any way interfere with the surveys, at such times and for such periods as the District Engineer may deem necessary.

(t) Materials.—(1) All materials shall be new and of the best quality of their respective kinds and fully up to the general standards of these specifications, and all workmanship shall be fully up to the highest standard of modern construction and practice.

The District Engineer may at any time order the removal of rejected material from the site of the work.

(2) Materials shall be stored so as to insure the preservation of their quality and fitness for the work. Stored materials shall be located so as to facilitate prompt inspection.

During the progress of the work all material taken up and new material to be used shall be piled and disposed of by the Contractor so that public traffic and private property shall not be unduly interfered with and all material shall be put in places approved by the District Engineer.

(3) Samples of all materials used or offered for use in connection with the work shall be furnished to the District Engineer without cost to the District, and he shall be given facilities and time of not less than twelve (12) days for inspection and testing of materials where necessary, in his opinion, to check other tests.

No material shall be used until it has been approved by the District Engineer.

In addition to the above, the Contractor shall furnish, at his own expense, materials and samples for all tests specified herein or deemed necessary by the District Engineer, and shall provide facilities at his own expense, on all parts of the work and at sources of supply, for the necessary sampling and inspection of materials to be furnished, and of work performed.

The standard and tentative specifications of the American Society for Testing Materials, referred to hereinafter by title or by their serial designations, are made a part of these specifications and of any contract based thereon. When the abbreviation "A.S.T.M." is used, it shall mean the American Society for Testing Materials, whose main office is at 1315 Spruce Street, Philadelphia, Pa. The requirements of said society, except as herein specifically modified or otherwise provided for, shall govern for all materials required to complete any work specified, where detailed specifications are omitted as a whole or in part.

(u) Inspection.—The Board of Directors, District Engineer and other authorized representatives and assistants shall at all times have access to the work during its construction and shall be furnished with every reasonable facility for ascertaining that the stock and materials used or employed, and workmanship are in accordance with the intention of these specifications.

(v) Use of Explosives.—When the use of explosives is necessary for the prosecution of the work, the Contractor shall use the utmost care not to endanger life or property. All explosives shall be stored in a secure manner, in compliance with local laws and ordinances, and all such storage places shall be marked clearly "Dangerous Explosives."

(w) Damage to Property.—The Contractor shall restore, at his own expense, all damaged property, whether public or private, including sidewalks, curbs, fences, pipes, conduits, sewers, monuments, stakes, bridges, culverts, pavements, etc., to a condition as good as it was when he entered upon the work, and in working order for the use and purposes intended. He shall take such precautions as are necessary to avoid damage and he shall properly strengthen structures over which he may move his implements of equipment, before using them.

The Contractor will be held responsible for all damage caused by his equipment or the use of same, and shall hold the District free and harmless from any or all damage or cost of damage whatsoever.

The Contractor shall be responsible for any and all damage to any person or property resulting from defects or obstructions or from any cause whatsoever during the progress of the work or at any time before its completion and final acceptance, and shall indemnify and save harmless the District and its officers and employees from all suits or actions of every name and description brought for, or on

account of any injuries or damages received or sustained by any person or persons by or from the Contractor, his servants or agents; and so much of the money due to the Contractor by virtue of the contract as is considered necessary by the Board of Directors shall be retained by the District until such suits or claims for damages shall have been settled and evidence to that effect furnished to the satisfaction of the Board of Directors.

Where the Contractor uses any private property he shall make all arrangements therefor and shall assume all damages resulting therefrom.

Where property of the District is damaged said District will deduct from any or all payments due an amount sufficient to repair any and all such damage. If the cost of repairing such damage is in excess of the amount due or to become due the Contractor, the Contractor and his bondsmen shall be jointly liable to pay the amount of such excess to the District.

(x) No Personal Liability.—The District, the Board of Directors or any member thereof, the District Engineer, his representatives, or any other officer or authorized employee of the District, shall not in any manner be answerable or accountable for any loss or damage that may happen to the work, or any part thereof, or on account of said work or part thereof, or on account of any action of the Contractor, his agents or employees, whether in connection with said work or the performance of any part thereof, or otherwise, and the Contrac-

tor must make good all damage from whatsoever cause, being strictly responsible for the same under this contract.

(y) Eight Hours to Constitute a Day's Work.—The time of service of any laborer, workman or mechanic employed upon any of the works herein specified shall be limited and restricted to eight (8) hours during any one (1) calendar day, and no laborer, workman or mechanic employed upon said work herein specified shall be required or permitted to labor more than eight (8) hours during any one (1) calendar day, except in cases of extraordinary emergency caused by fire, flood or danger to life or property; provided, however, that within thirty (30) days after any employee is permitted to work over eight (8) hours in any one (1) calendar day, due to such extraordinary emergency, the Contractor or his duly authorized agent shall file with the Board of Directors of the District a report verified by his oath setting forth the nature of the said emergency, which report shall contain the name of said worker and the hours worked by him on said day, and failure to file the said report within the said time shall be prima facie evidence that no extraordinary emergency existed. The Contractor and each subcontractor shall also keep an accurate record showing the names and actual hours worked of all workers employed by him in connection with the said public work, which record shall be open at all reasonable hours to the inspection of the Board of Directors of the District or its agent, and to the chief of the Division of Labor Statistics and Law

enforcement of the Department of Industrial Relations, his deputies or agents.

The Contractor shall forfeit as a penalty to the District ten dollars ($10.00) for each laborer, workman or mechanic employed in the execution of said contract by him or by any subcontractor under him upon any public work herein specified for each calendar day during which said laborer, workman or mechanic is required or permitted to labor more than eight (8) hours in violation of the provisions of Section 653c of the Penal Code of the State of California, and amendments thereto, and said sums and amounts which shall have been so forfeited pursuant to this paragraph shall be withheld and retained from payments due to the Contractor pursuant to this contract and the terms of said act; provided, however, that no sum shall be so withheld, retained or forfeited, except from the final payment, without a full investigation by either the Division of Labor Statistics and Law Enforcement of the State Department of Industrial Relations, or by said Board of Directors.

(z) Structures.—(1) The removal and replacing of any existing structures, pipes, sewers, conduits, wires, etc., necessary for the proper completion of any work herein specified, shall be performed by the Contractor and no claim for extra work shall be made for such removal and replacement.

(2) In case it shall be necessary to remove any telephone, telegraph or electric power transmission

poles, water pipes, electrical conduits, or underground structures of any character, or any portion thereof, the owner or owners thereof, or their agents or superintendents, shall be notified by the Contractor and the Contractor shall make the necessary arrangements for such removal. The right is reserved to the District and also to railway, water, gas, telephone, telegraph and electrical power transmission companies to enter upon the work for the purpose of making repairs and changes that have become necessary by reason of the work specified herein.

(3) The Contractor shall thoroughly investigate all existing poles, wires, pipes and conduits above and below ground and shall provide for the maintenance or replacing of same in good condition and at no expense to the District. Any necessary new or additional pipe or material shall be furnished by the Contractor at his expense.

(4) At the completion of the work the Contractor shall furnish the District Engineer with a written certificate from the owner or owners of each and all such conduits, pipes or structures to the effect that such replacements and maintenance have been satisfactorily performed.

(5) In case work is to be done over or under railroad tracks the Contractor shall make all arrangements with the railroad companies concerned and shall give written notice to the District that such necessary arrangements have been made before any work at such places shall be started.

(z-2) Payment of Not Less than the General Prevailing Rate of Wages.—The Contractor and all subcontractors under him shall pay all their laborers, workmen, mechanics and employees on said work a salary or wage at least equal to the prevailing salary or wage for the same quality of service rendered to private persons, firms or corporations under similar employment, and which salary or wage shall not be less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the work is performed, and not less than the general prevailing rate of per diem wages for overtime work, and which salary or wage shall not be less than the stipulated rates contained in a schedule thereof which has been ascertained and determined by the Board of Directors of the District and which is now on file with the Secretary of said Board and by reference incorporated herein and made a part hereof and a copy of which is hereto appended and marked "Exhibit A." The Contractor shall forfeit as a penalty to the District ten dollars ($10.00) for each laborer, workman or mechanic employed, for each calendar day, or portion thereof, such laborer, workman or mechanic is paid less than the said stipulated rates for work done under said contract, by him, or by any subcontractor under him in violation of Chapter 397 of the Laws of 1931 of the State of California, and said sums and amounts which shall have been so forfeited shall be withheld and retained from payments due to the Contractor

pursuant to this contract and the terms of said Act; provided, however, that no sum shall be so withheld, retained or forfeited, except from the final payment, without a full investigation by either the Division of Labor Statistics and Law Enforcement of the State Department of Industrial Relations or by said Board of Directors.

(z-3) Alien Labor and Record of Names and Citizenship of All Workers Employed.—The Contractor and Subcontractor upon said work herein specified shall not employ or cause or allow to be employed thereon any alien except in cases of extraordinary emergency caused by fire, flood or danger to life or property; provided, however, that within thirty (30) days after any alien is permitted to work thereon due to such an extraordinary emergency, the Contractor doing the work, or his duly authorized agent, shall file with the Board of Directors a report verified by his oath, setting forth the nature of the said emergency and containing the name of the said alien and each date he was permitted to work, and failure to file the said report within the said time shall be prima facie evidence that no such extraordinary emergency existed. The Contractor and each Subcontractor shall also keep, or cause to be kept, an accurate record showing the names and citizenship of all workers employed by him, in connection with the said public work, which record shall be open at all reasonable hours to the inspection of the District Engineer,

his deputies and agents or to the Board of Directors, its deputies and agents, and to the Chief of the Division of Labor Statistics and Law Enforcement of the State Department of Industrial Relations, his deputies and agents.

The Contractor shall forfeit as a penalty to the District ten dollars ($10.00) for each alien employed in the execution of said contract, by him, or by any subcontractor under him, upon said work herein specified, for each calendar day, or portion thereof, during which such alien is permitted or required to labor in violation of the provisions of Chapter 398 of the Laws of 1931 of the State of California, and said sums and amounts which shall have been so forfeited pursuant to the herein paragraph shall be withheld and retained from payments due to the Contractor pursuant to this contract, and the terms of said Act; provided, however, that no sum shall be so withheld, retained or forfeited, except from the final payment, without a full investigation by either the Division of Labor Statistics and Law Enforcement of the State Department of Industrial Relations or by said Board of Directors.

(z-4) Traffic and Detours.—The Contractor shall provide for ingress and egress for people living adjacent to the site of work and for through traffic where good detours cannot be arranged. He shall arrange to take care of the existing traffic so as to inconvenience the public as little as possible. He shall provide and maintain such fences, barriers,

signs, red lights, watchmen and other means as may be necessary to prevent accidents to the public. He shall furnish and place at points designated by the District Engineer such signs as may be necessary to direct or control traffic and shall provide lights as may be necessary for illuminating the said signs.

All expense in connection with the construction and maintenance of detours and the above mentioned provisions for the public safety shall be at the expense of the Contractor.

(z-5) Schedule of Work.—The Contractor shall submit to the District Engineer within five (5) days after signing the contract a proposed schedule of work, setting forth times of commencement, proposed progress and probable dates of completion of the various units and phases of the work. Such schedule may be altered or amended from time to time, by and with the written approval and consent of the District Engineer, but such alteration or amendment shall not in any case be construed to change the final date of completion of the work as set forth in the contract.

[Clerk's Note: As Amended by Plaintiff's Exhibit No. 10.]

(z-6) General Provisions.—In all cases where the said final specifications provide that the Contractor shall submit to the District Engineer with his bid detailed information, test data, performance curves, or other matters pertaining to equipment or materials to be furnished, or data in connection

therewith, or other such information as is hereinafter called for in these specifications to be submitted with bids, such data and information setting forth all of the matters and things as specified shall not be submitted with the bid but instead shall be submitted to the District Engineer in sufficient time to permit of checking and testing but not less than four (4) months prior to the installation of such equipment on the project.

SECTION 7. CLEARING

1. Clearing.—Clearing shall consist of clearing and grubbing the site of the work of all trees, rubbish, stumps, roots, grass, heavy sod, debris, decayed vegetable matter or other encumbrances, and the removal and disposal of same. Trees or stumps within the roadway area shall be removed to a depth of not less than three feet (3′) below the finished grade of any roadway area, and the holes thus made shall be backfilled with earth or gravel and thoroughly tamped. Trees or stumps on portions outside of roadway areas or within the roadway areas upon which fills in excess of three feet (3′) are to be placed, or on areas where the District has slope privileges but which will be under fills, may be cut off at the level of the ground as it exists prior to the placing of the fills. On slopes in excavation, trees, stumps and roots shall be cut off to the line of the finished slopes.

2. Disposal of Cleared Material.—Trees, stumps, brush, limbs and other debris for which burning is

practicable, may be burned or otherwise disposed of away from the site of the work at the expense of the Contractor. No accumulation of inflammable or combustible material shall be permitted to remain on or adjacent to the site of the work. Burning shall be done in a manner to prevent damage to surrounding or adjacent property and shall conform to all rules, regulations and ordinances of the State, County or Municipality where such apply. The District Engineer shall have the right to regulate the hours in which burning is done, so as not to interfere with other portions of the work, and to prevent inconvenience to nearby residents and property owners.

The Contractor shall obtain the approval of the District Engineer as to methods and time of burning, before any such operation is permitted.

Material which cannot be efficiently destroyed by burning shall be removed entirely and disposed of away from the site of the work by the Contractor who shall make his own arrangements for such removal and disposal.

3. Payment for Clearing.—No separate payment or allowance shall be made to the Contractor for work connected with clearing, grubbing and disposal of debris, but the price paid per unit of work under "Grading" shall include full compensation for furnishing all labor, materials, tools, implements and equipment, and doing all incidental work necessary to clear the site of the work as above specified.

SECTION 8. GRADING

1. Description.—Grading shall consist of the performing of all operations necessary, to excavate earth and rock from the roadway prism, to excavate ditches and borrow pits, to build fills and embankments in the locations and to the elevations, form and cross-sections designated or planned for same, to grade all approaches to structures, either existing or new and to make proper connections with existing streets or roadways, to transport excavated material to portions of the work where a deficiency exists within the limits of free haul designated, to dispose of surplus material from the site of the work, and shall include the furnishing of all labor, materials and equipment necessary for these operations and the performance of incidental work of whatsoever nature as may be required to build the grade and the approaches to it and maintain them in the form specified until the completion and acceptance of the contract.

2. Construction Roads.—Grading involved in the building of construction roads which may be required to give easy access to any portion of the work, or to facilitate constructing embankments in layers, or which may be done for the convenience of the Contractor or may be necessary for the proper operations of the Contractor in the conduct of the work, will not be paid for. Full compensation for such work will be considered as included in the price bid for "Grading," and no additional allowance will be made therefor.

3. Unsuitable Materials.—All soft or unsuitable material shall be excavated and the space refilled with good earth, gravel or other suitable material satisfactory to the Engineer, before making fill upon it. Soft spots shall be excavated to a depth of at least two feet (2′) and refilled. The yardage actually removed will be paid for at the unit price bid for "Grading."

In solid rock excavation or other material which cannot be readily plowed, the material shall be loosened and broken up for the full width of the roadbed, so that any ribs or solid projections shall be at least six inches (6″) below subgrade elevation. The yardage so broken up for a depth of six inches (6″) will be paid for at the unit price bid for "Grading." The broken up material shall be removed and the resulting space refilled with approved material, provided, however, that the Engineer may, if, in his judgment, the broken up material is satisfactory for subgrade material, permit such material to remain without removal.

4. Blasting.—Excessive blasting or over shooting will not be permitted and the Contractor will be required to remove at his own expense any material outside the authorized cross-sections which may be shattered or loosened by blasting. The Contractor will be liable for any damages of any nature caused to public or private property, either on or off the right-of-way, by blasting operations. The Engineer shall have authority to require the Contractor to

discontinue any method of blasting which leads to overshooting or is dangerous to the public or destructive to public or private property or to natural features, but such authority of the Engineer shall not relieve or release the Contractor from his responsibility or liability for damages of any kind.

5. Slides.—The removal of large slides from outside the limits of the staked cross-section, which come into the roadway through no fault of the Contractor, will be paid for at the unit price bid for "Grading." This provision shall not be construed as to relieve the Contractor from the duty of maintaining true to cross-section all slopes and ditches, or from the requirements set forth above under "Blasting."

6. Slopes.—Excavations shall be finished with all slopes cut true and straight, in conformity with the lines and grades of slope set by the District Engineer, and all slopes whether old or new shall be maintained with true and even surfaces.

7. Drainage Ditches.—Drainage ditches shall be constructed as shown on the plans or as directed by the District Engineer, true to grade and cross-section, and thereafter so maintained for the duration of the contract. The Contractor shall exercise care to prevent excavating below the grade for the bottom of the ditch. Holes and depressions below the grade of the bottom of the ditch shall be filled with suitable material and compacted at the expense of the Contractor.

Drainage ditches off the line of the right-of-way and water channels for changing the course of streams, where shown on the plans or ordered by the District Engineer, shall be excavated by the Contractor.

8. Widening Cuts.—The District Engineer may direct that cuts be widened and slopes increased over the widths and slopes shown upon the plans, when, in his judgment, such work is necessary to provide material needed for embankments or to obtain stability of slopes; and provided that such direction is given prior to the actual commencement by the Contractor of excavation in the cut to be widened.

If the material is of such nature that it will stand at a steeper slope than that shown on the plans, and when the material that would be excavated by cutting back to the slope shown on the plans is not required or is not suitable for embankment purposes, such slopes shall be decreased where ordered by the Engineer.

9. Selected Material.—When suitable material is encountered in excavation, which, in the opinion of the Engineer, should be used for finishing, the Contractor shall excavate and segregate such material, pile the same within the limits of free haul, and later use this material to surface the roadbed or to construct shoulders. Selected material so stockpiled and later placed on the roadway by the Contractor will be paid for twice at the unit price bid for "Grading." Such additional payment, however,

will not be made if material so stockpiled is not actually placed on the roadway by the Contractor, in which case it will be paid for but once as provided under payment for "Grading."

10. Measurement.—Quantities of excavation will be computed by the method of average end areas, the distance between end areas being measured along the center line of the roadway. Excavation in excess of the authorized cross-section will not be paid for. The final estimate of excavation quantities will be the quantities included within the slope stakes set to define the limits of work and authorized modifications therefrom. This shall include authorized borrow and removal of unpreventable slides. Selected material stock-piled and later placed on the shoulders or used for surfacing will be estimated twice, both when excavated from the roadway and when rehandled from the stock piles.

11. Payment.—The price paid per cubic yard for "Grading" shall include full compensation for clearing and grubbing, the excavation, loading, transporting, depositing, watering and compacting of the roadway materials in accordance with the specifications, and all other work incidental thereto. Excavating unsuitable material, slide removal, excavation of drainage ditches, surface ditches and channels for changing the courses of streams, rehandling stockpiled material on the surface or shoulders will be paid for at the unit price bid for "Grading," which price shall include full compensation for all work necessary or incidental thereto.

Overhaul will be paid for as otherwise herein provided.

12. Embankment.—(a) After the site of the work has been cleared and grubbed to the satisfaction of the Engineer, the total width upon which fill is to be made shall be plowed and broken up so that new fill material will bind with the old earth. When embankments are to be made on hill sides or where new fill is to be applied upon existing embankments, the slopes of the existing surfaces shall be plowed deeply or cut into steps before the filling is commenced.

Only material suitable for embankments shall be used for filling. The best fine surfacing material shall be saved for finishing. Clods or hard lumps of earth over six inches (6″) in greatest dimension shall be broken up before being placed in the fill with the object of obtaining a dense embankment. Large rocks or hard lumps such as hard-pan or cemented gravel which cannot be broken readily shall be distributed throughout the embankment and filled around with fine material so as to secure a dense compact embankment. No such rocks or lumps over six inches (6″) in size shall be placed in the upper two feet (2′) of embankment unless they are buried so as to have a cover of not less than half their greatest dimension.

When embankments are made of stone, the material shall be carefully placed so that the large stones shall be well distributed and the interstices com-

pletely filled with smaller stone and earth to form a dense, solid embankment.

All adobe material placed in embankment shall be deposited at the bottom of the fill and no adobe shall be placed in embankment above a point one foot (1′) below the finished grade.

(b) Compacting.—Except as otherwise specified herein embankments shall be constructed in layers not exceeding eight inches (8″) in thickness. The sides of the fill shall be placed first and the center shall be carried up lower than the sides. Each layer shall be thoroughly compacted by rolling with a twelve (12) ton three-wheeled power roller or with a tamping roller, the outer surface of which shall be studded with teeth not less than seven inches (7″) long and having a surface area of approximately four square inches (4 sq. in.) each; the roller shall be of such a weight that the load upon each tooth will be not less than three hundred pounds (300 lbs.). Unless the material when placed in the fill is moist enough to be properly compacted, each layer shall be watered sufficiently to dampen the material before being rolled. Successive layers shall not be placed until the layer under construction has been thoroughly compacted.

Embankments built of rock or rocky material shall be constructed in layers from eight inches (8″) to not more than eighteen inches (18″) in thickness, and watered and rolled thoroughly with a three-wheeled power roller weighing not less than twelve (12) tons. The use of tamping or sheepsfoot

rollers will not be permitted for compacting layers over eight inches (8″) in thickness. The thickness of the layers of the material containing large rock shall be the minimum which the size of the rock present in the material will permit, but in no case shall the thickness of the layers exceed eighteen inches (18″). The Contractor will be required to break up oversize rock with sledges or otherwise to make the layers conform to the maximum allowable thickness.

In advance of watering and rolling, sufficient earth or other fine material shall be incorporated with the coarse rock, as it is deposited, to provide a dense solid embankment. Overhaul will be paid on such earth or fine material if it is necessary to haul it further than the limit of free haul.

In making fills or embankment around columns, abutments or other parts of structures the work shall be done as specified under "Backfill," paragraph 2 of Section 9.

(c) Shrinkage Allowance and Maintenance.—Embankments shall be maintained to the grade and cross section shown on the plans or otherwise authorized or directed, until the completion and acceptance of the contract. Suitable allowance for shrinkage and compression shall be provided for by the Contractor in the building of embankments.

The Contractor shall be responsible for the stability of all constructed embankments and shall replace, without cost to the District, any portions which in the opinion of the Engineer have become

displaced, due to carelessness or negligence, on the part of the Contractor, his employees or agents.

(d) Surplus Excavated Material.—All surplus excavation and waste material shall be used to widen embankments uniformly or to flatten slopes, or shall be disposed of in such other places and for such purposes as the Engineer may direct. The Contractor shall not waste material without written authority from the Engineer. Full compensation for the disposal of surplus excavated material shall be considered as included in the prices bid per cubic yard for "Grading," and no additional allowance will be made for such disposal.

(e) Payment.—Full compensation for constructing and compacting embankments as herein specified shall be considered as included in the prices bid per cubic yard for "Grading" and no additional allowance and no other charge will be allowed for the performance of any operation specified or intended or necessary to conform properly to the results intended by these specifications.

13. Overhaul.—(a) When excavated material is disposed of as provided by these specifications or as directed by the Engineer, within a distance of five hundred feet, no payment for overhaul shall be made, it being understood that a free haul of five hundred feet is covered by the price paid for "Grading." When excavated material is required to be hauled beyond five hundred feet (500′), the haul beyond five hundred feet (500′) shall be classed as "Overhaul."

Overhaul shall be measured by the station yard and for the purpose of measurement a station is defined as one hundred feet (100'). In computing overhaul, the number of station yards will be determined as the product of the number of cubic yards remaining in any cut, after proper deduction has been made for material placed within the free haul distance by the number of stations such material is hauled, less the five (5) stations of free haul. The distance such material is hauled will be taken as the distance between the center of volume of such remaining cut and the center of volume of the corresponding fill. The distance between centers of volume will be measured along the center line of construction.

The Contractor shall notify the District Engineer when overhaul is to be performed and no payment will be made for any overhaul unless such notification is given and a written authorization obtained from the District Engineer to proceed. Such authorization will set worth the approximate amount of overhaul for which payment will be made, and the method of measurement of same, to be agreed upon by the Contractor in writing. The decision of the District Engineer shall be final in all questions which may arise as to the disposition of material and the amount of overhaul to be allowed.

(b) Payments.—The price bid per station yard for "Overhaul" shall include full compensation for hauling and/or transporting and depositing material beyond the free haul distance as above specified.

SECTION 9. EXCAVATION FOR STRUCTURES

1. Excavation.—Excavation, including the replacing of excavated material or backfill of trenches for pipe culverts, headwalls and concrete culverts, bridges, retaining walls or other structures will be known as "Structural Excavation."

"Structural Excavation" shall include the removal of all material of whatever nature necessary for the construction of foundations and substructures in accordance with the plans or approved modifications thereof. It shall include the construction of all bracing, cribs, cofferdams, caissons and other details as may be necessary and the subsequent removal of bracing, cribs, cofferdams, caissons and other structures. It shall also include the furnishing of all materials and equipment necessary to perform the work specified, together with the incidental structures necessary.

Trenches shall be excavated of a size equal to the approximate size of the structure to be built therein, plus the additional size required for proper cribbing.

2. Backfill.—After the piers and abutments are in place materials shall be backfilled to the original ground line. No material shall be deposited in fills against the backs of abutments or walls until twenty-one (21) days have elapsed after the pouring of the concrete in the main walls taking stress.

Backfill over and around culverts, arches, abut-

ments and columns shall be brought up uniformly on all sides in order to avoid causing binding or distortional stresses in the structures.

Backfill shall be placed carefully in horizontal layers not exceeding eight inches (8″) in thickness and puddled or tamped or rolled as the District Engineer may direct. Puddling shall be prohibited in any situation where it might soften the foundations or develop hydrostatic pressure behind walls. The District Engineer may require selected material to be used in locations where, in his judgment, such use is necessary.

Material which is unsuitable for use in backfill shall not be used as such, but may be used on other parts of the work, if suitable, or, if no such place exists, shall be disposed of by the Contractor at his own expense, in a manner to be approved by the District Engineer. Surplus material which may be suitable for backfill shall be transported and used to backfill where a deficiency of suitable backfill material exists, at the site of structures or to widen fills, and no additional charge shall be made for the transporting and handling of such excess material, or unsuitable material being disposed of.

8. Measurement.—Structural excavation shall be estimated to include the actual volume of material removed to neat vertical planes, surrounding the foundation structure; and no allowance will be made for such excavation outside of neat planes as may be necessary for bracing, cribbing, cofferdams or other auxiliary structures. The top and bottom

limits of computed volume shall be the original ground surface and the bottom of the completed footing; except that for culverts in roadway or ditch cuts the volume will be computed up to the finished subgrade only and for culverts in roadway fills will be computed to the original ground surface before the fill was placed.

No allowance will be made for the removal of material caused by swelling or rising of the ground due to the driving of piles or the flow of materials through or under cofferdams or caissons.

No measurement will be allowed for backfill, but such operation shall be included in the price paid per cubic yard for material in "Structural Excavation."

4. Payment.—The price paid per cubic yard for "Structural Excavation" "Class A" shall include full compensation for excavating, backfilling and disposing of surplus material as specified and including the cost of construction of all bracing, cribs, cofferdams, caissons and other auxiliary structures and their subsequent removal.

If it is necessary in the opinion of the District Engineer to increase the depth of any or all of the excavations more than two feet (2′) below the depth shown on the plans, such excavation below said two foot (2′) additional depth will be paid for at the unit price bid for "Structural Excavation" "Class B."

No measurement will be made or separate payment allowed for "Structural Excavation" where

such excavation is specifically included as part of structures or other units of work and paid for as such, as otherwise provided herein.

SECTION 10. SUBGRADE

1. Description.—The subgrade will be considered as that portion of the roadway forming the foundation on which surfacing or paving is to be placed.

Before the surfacing or paving is placed the subgrade shall be constructed conforming to the grades and cross-sections shown on the plans and in accordance with these specifications.

The finished subgrade shall be true to cross-section, hard, uniform, smooth and must support without perceptible indentation the wheels of heavily loaded trucks.

2. Preparing Subgrade.—The surface of the roadway where pavement is to be constructed shall be brought by excavation and embankment to an elevation two inches (2″) lower than the bottom surface of the pavement, as shown on the plans. The roadbed shall then be thoroughly watered and all fills more than one foot (1′) in depth shall be dyked and flooded with water for a sufficient length of time to allow full settlement to take place. The grade shall then be rolled thoroughly and rolling shall be extended over the adjacent shoulder areas at the same time. Headerboards as hereinafter specified shall then be constructed true to line and grade. The area between the headerboards shall

then be loosened to a depth of approximately six inches (6″) with a rooter, scarifier or plow so operated that no ribs of compacted material will be left in place. Clods shall be broken up and the loosened material disked to its full depth with a cultivator. High spots shall be removed and depressions filled by means of a scraper and the cultivating continued until the soil is pulverized.

The pulverized soil shall be roughly shaped to cross-section and rolled with a power roller weighing not less than three hundred and fifty (350) pounds per lineal inch width of tire. The surface shall then be graded uniformly to a height of two inches (2″) below the bottom surface of the proposed pavement by means of a subgrader or shaper riding on the headerboards. The area between the headerboards shall then be backfilled with gravel or crushed rock backfill hereinafter specified to a depth which will, after final rolling and shaping, make a thoroughly compact subgrade true to crown and section and grade of the bottom of the proposed pavement. The gravel or crushed rock backfill shall then be worked into the previously prepared material by a harrow or cultivator until a uniform distribution of the two materials is had.

The grade shall then be watered uniformly with a sufficient quantity of water to saturate the mixed materials and shall be worked with a cultivator until the loose material for its entire depth is at the proper consistency for rolling. If dry spots become apparent, or, if spongy or wavy spots due to

use of two much water or not enough harrowing develop during rolling, the condition shall be corrected before proceeding further. Rolling shall be continued until no more compression is possible. Additional gravel or crushed rock shall be added where necessary to bring the section to the required elevation, and rolling and watering shall be continued until the entire subgrade is smooth and compact and slightly higher than the finished subgrade elevation.

Immediately after rolling the subgrade shall be cut to true grade and cross-section by means of a subgrader riding on the headerboards. The excess material shall be removed immediately and on the final cut the wheels of the subgrader shall rest on the headerboards at all points as indicated when they are revolving.

After the final cut the subgrade shall be checked by means of a scratch template. The nails in this template shall be not more than three inches (3″) apart and shall project at least three-quarters of an inch (¾″) from the wood in such a manner as to be on line for the true depth and surface of the subgrade when the template is supported on each side of the headerboards. Any high spots in the subgrade shall be immediately corrected. Low spots will be backfilled, provided the entire area is scarified, watered and rerolled after such backfilling or the Contractor may compensate for the low subgrade by additional thickness of pavement. No alteration of the finished pavement grade will be

permitted on account of low subgrade, and the additional thickness of pavement shall be provided by the Contractor at no expense to the District.

When the subgrade has been finally tested and approved by the District Engineer it shall again be watered and shall then be protected by the Contractor against damage by either his own or public traffic. Any irregularities which develop in the subgrade due to use thereof by the Contractor or the public or by storage of materials, or by any other cause, shall be corrected by the Contractor before pavement is placed.

3. Crushed Rock or Gravel Backfill.—The crushed rock or gravel backfill required for making subgrade shall be such a mixture of crushed rock or gravel or broken rock as will readily compact and after rolling and watering will make a hard, firm dense subgrade. Material from the roadway excavation will not be used for this backfill. The material shall not contain any rock or gravel over one inch (1″) in its largest dimension, and shall all be retained on a screen having one-quarter inch (¼″) openings. The Contractor shall submit samples of the material to be used to the Engineer and receive his approval before any shall be placed on the grade.

4. Payment.—The price paid per square foot for the various types of pavement shall include full compensation for all plowing, harrowing, watering, rolling, furnishing and placing crushed rock or

gravel, backfill, grading and shaping and finishing subgrade, and for furnishing all labor, materials, tools, implements and equipment and doing all work incidental to shaping and preparing the subgrade for pavement.

* * * * * * * *

SECTION 13. PORTLAND CEMENT CONCRETE

Composition of Concrete

1. Description.—Portland Cement Concrete shall be composed of specified mixtures of Portland Cement, fine aggregate, coarse aggregate and water, in two (2) general classes, as follows:

Class "A"—For sections of concrete structures having a thickness of eight inches (8") or less, or having reinforcing bars spaced four inches (4") or less in the clear.

Class "B"—For pavement, and for sections of concrete structures, including tunnel lining, having a thickness greater than eight inches (8") and having reinforcing bars spaced more than four inches (4") in the clear.

For concrete structures where strict adherence to this classification would require placing both concrete of Class "A" and Class "B" in small quantities in a continuous placement, the District Engineer

may permit the use of either class of concrete throughout the section, as he deems desirable, and his judgment in such cases shall be final.

2. Proportions and Consistency.—The proportions of fine and coarse aggregate to be used for each class of concrete will be determined by the District Engineer after the materials have been delivered to the site of the work. Such proportions will depend upon the grading of the aggregates, but the amount of fine aggregate shall always be the minimum amount required, which, when combined with cement, will produce only a slight excess of mortar over that necessary to completely fill the voids in the coarse aggregate. The District Engineer shall have the right to change the proportions of cement and of fine and coarse aggregate and the consistency of the concrete mix, when, in his judgment, such change is desirable.

The amount of water required for the proper consistency of each class of concrete shall be determined by the District Engineer by means of the slump test, made in accordance with the Tentative Method of Test for Consistency of Portland Cement Concrete, Serial Designation D 138-26T, of the American Society for Testing Materials. In general, the consistency of the concrete shall be as dry as in the judgment of the District Engineer, can be thoroughly compacted in the forms through the use of vibratory tampers to completely fill the forms without voids or stone pockets.

Samples for slump tests will be taken from the mixture immediately as it enters the forms.

Class "A" Concrete shall be a mixture as herein specified, in which the amount of cement in the finished product shall be not less than five hundred and seventeen (517) pounds and not more than six hundred and eleven (611) pounds per cubic yard of concrete. It is expected that the proportions of cement, fine aggregate and No. 4 to one and one-half inch (1½") coarse aggregate will be approximately 1:2:4 by weight, and that the slump will be not less than two inches (2") nor more than four inches (4").

Class "B" Concrete shall be a mixture as herein specified, in which the amount of cement in the finished product shall be not less than four hundred and seventy (470) pounds and not more than five hundred and sixty-four (564) pounds per cubic yard of concrete. It is expected that the proportions of cement, fine aggregate, No. 4 to one and one-half inch (1½") coarse aggregate and one and one-half inch (1½") to two and one-half inch (2½") coarse aggregate will be approximately 1:2½:4:1 by weight, and that the slump will be not less than one inch (1") nor more than four inches (4").

The range in amounts of cement and in permissible slump is for the purpose of obtaining the best mix with the aggregates furnished, adapted to the methods of transportation and placing of concrete to be used by the Contractor in the various structures. In general, when the maximum slump is

necessary, the larger amount of cement will be required, but it is the purpose and intent to obtain mixtures which will produce the desired strength with the minimum amount of cement. It is hereby specified, and the District Engineer will require, that methods of handling and placing be adopted which will permit the use generally of a mixture whose consistency will approximate the lower limits of the specified slumps.

Should conditions arise which, in the opinion of the District Engineer, require, for proper transporting and placing, the use of concrete mixtures which have consistencies producing a slump in excess of the maximum specified, the District Engineer shall determine an additional amount of cement to be added to the mixture for the purpose of obtaining a strength equivalent to that of the specified mixture, and the Contractor shall furnish such additional cement at his expense and without charge to the District. The judgment of the District Engineer shall be final and binding upon the Contractor as to the necessity for and the amount of additional cement to be furnished and used.

This provision shall not be construed as giving the Contractor the option of supplying additional cement as an alternative to using methods of transporting and placing concrete of the type specified, but is intended only to meet special or unusual conditions which may arise due to the nature of the work and the possible hazards which may be involved.

Cement

3. Description.—The cement used in concrete shall consist of Portland cement conforming to the requirements of the Standard Specifications for Portland Cement, Serial Designation C9-30 of the American Society for Testing Materials.

4. Delivery.—Cement shall be furnished in bags or sacks containing ninety-four (94) pounds of cement net, with the brand and the name of the manufacturer plainly marked thereon, or, with the approval of the District Engineer, may be furnished in bulk.

5. Storage.—Cement shall be stored so as to permit of ready access for inspection and identification of each shipment, and shall be protected from exposure to moisture until used. Cement shall not be stored on the work longer than sixty (60) days, and any cement that becomes caked, lumpy or hardened shall be rejected and removed at the Contractor's expense.

6. Plant Inspection and Testing.—The Contractor shall make arrangements with the cement company from whom cement is purchased to set aside sealed bins from which samples may be taken by the Engineer, and no cement shall be shipped to the work except from such bins. Information for identification of the bin from which cement is obtained with times of filling, sampling and shipment shall accompany each shipment of cement. No cement shall be shipped to the work until it shall have satisfactorily passed all tests required by these speci-

fications, including the 28-day test for tensile strength. At intervals of approximately one month, the records of quantities of cement shipped, cement received, cement used in concrete, and cement remaining in storage at the work shall be made available to the Engineer.

The Engineer shall have the right to sample and test cement on the work, and the approval of any cement at the plant shall not prevent the rejection of cement on the work when such cement does not in every respect conform to these specifications.

Water

7. Description.—Water used for mixing concrete shall be clean and clear, free from injurious amounts of acids, alkalis, oil, sulphates, organic matter or other deleterious substances. In determining the suitability of water for use, the Engineer's judgment shall be final. Water from the regular supply of the East Bay Municipal Utility District will be considered satisfactory.

Aggregates

8. Description.—Aggregate shall consist of clean, hard, strong, durable particles of inert mineral material, free from injurious amounts of organic matter, oil, alkali and salt, and conforming to the requirements of these specifications. Aggregate shall consist of three classes, namely, fine aggregate, No. 4 to 1½ inch coarse aggregate, and 1½ to 2½ inch coarse aggregate.

For each class of aggregate the amount of clay shall not exceed one per cent (1%) by weight, and the total amount of clay, shale and soft or flaky particles shall not exceed five per cent (5%) by weight.

Aggregate for test shall be sampled in accordance with the Standard Methods of Sampling, Serial Designation D75-22, of the American Society for Testing Materials. The sieve analysis shall be made in accordance with the Standard Method of Test for Sieve Analysis of Aggregates for Concrete, Serial Designation C41-24 of the American Society for Testing Materials.

Aggregate of each class shall be from one source of supply only, except by permission of the District Engineer. Prior to the beginning of the work the Contractor shall submit representative samples to the District Engineer for test and approval, and the grading of aggregates as furnished shall not vary from that of the approved samples by more than the amounts hereinafter specified.

9. Fine Aggregate.—Fine aggregate shall consist of washed sand conforming to the requirements of these specifications.

The total amount of clay, silt and other material removable by decantation shall be not less than one per cent (1%) and not more than three per cent (3%) by weight, when tested in accordance with the Standard Method of Decantation Test for Sand and other fine aggregates, Serial Designation

D 136-28, of the American Society for Testing Materials.

The amount of organic matter shall be not greater than that which will produce a color equal to or lighter than that of the standard color solution, when tested in accordance with the Standard Method of Test for Organic Impurities in Sands for Concrete, Serial Designation C 40-27, of the American Society for Testing Materials.

Briquets of mortar made of one part of cement to three parts of fine aggregate, by weight, shall develop after the age of seven (7) days not less than ninety per cent (90%) of the strength of similar briquets made of standard Ottawa testing sand, using the same cement, the same mix, and having the same consistency.

Fine aggregate shall be well graded from coarse to fine within the specified limits, and when tested by means of laboratory sieves shall conform to the following requirements:

Passing No. 4 sieve	95% to 100%
Passing No. 30 sieve	25% to 45%
Passing No. 50 sieve	5% to 15%

The fineness modulus of fine aggregate as expressed by 1/100 of the sum of the cumulative percentages coarser than each of the Tyler standard sieves in the standard sieve analysis shall be not less than 2.50 nor more than 3.25.

The grading of fine aggregate shall be reasonably constant and the fineness modulus shall not vary from that for the approved representative sample submitted at the beginning of the work by more than ± 0.20.

10. Coarse Aggregates.—Coarse aggregate shall consist of washed gravel, washed crushed stone or washed crushed gravel, free from adherent coatings and conforming to the requirements of these specifications.

The total amount of clay, silt and other material removable by decantation shall be not more than five-tenths per cent (0.5%) by weight when tested in accordance with the Standard Method of Test for Quantity of Clay and Silt in Gravel for Highway Construction, Serial Designation D72-21, of the American Society for Testing Materials.

Coarse aggregate shall pass the Sodium-sulfate test for soundness, made in accordance with the Tentative Method of Test for Soundness of Coarse Aggregates by the Use of Sodium Sulfate, Serial Designation C89-31T, of the American Society for Testing Materials, except that aggregates failing in the accelerated soundness test may be used if they pass a freezing and thawing test satisfactory to the District Engineer.

Coarse aggregates shall have a French coefficient of wear of not less than ten (10) when tested in accordance with the Standard Method of Test for Abrasion of Rock, Serial Designation D2-26, of the American Society for Testing Materials.

Coarse aggregate shall be batched in two separate sizes, herein designated as No. 4 to 1½ inch coarse aggregate, and 1½ to 2½ inch coarse aggregate.

No. 4 to 1½ in. coarse aggregate shall be well graded within the specified limits, and shall conform to the following requirements:

Passing a sieve having 1½ in. sq. openings	95 to 100%
Passing a sieve having ¾ in. sq. openings	60 to 75%
Passing a No. 4 sieve	0 to 5%

The 1½ to 2½ in. coarse aggregate shall conform to the following requirements:

Passing a sieve having 3 in. sq. openings	100%
Passing a sieve having 2½ in. sq. openings	95 to 100%
Passing a sieve having 2 in. sq. openings	75 to 95%
Passing a sieve having 1½ in. sq. openings	20 to 40%
Passing a sieve having ¾ in. sq. openings	0 to 10%
Passing a No. 4 sieve	0 to 5%

For each coarse aggregate the grading shall be reasonably constant, and the fineness modulus as expressed by 1/100 of the sum of the cumulative percentages coarser than each of the sieves in the

standard sieve analysis, except the 1-inch and 2-inch sieves, shall not vary from that for the approved representative sample submitted at the beginning of the work by more than ± 0.50, except by special permission of the Engineer.

In case the concrete is not of workable character, or when finished does not exhibit a proper surface due to the presence of an excess of particles approximately one-eighth inch (⅛") to one-half inch (½") in size, either a fine aggregate having a sufficiently greater percentage of fine material or a No. 4 to 1½ inch coarse aggregate having a sufficiently smaller percentage of fine material shall be used, as directed by the Engineer.

Coarse aggregate used in Class A Concrete shall consist of No. 4 to 1½ inch coarse aggregate only. Coarse aggregate used in Class B concrete shall be a mixture of No. 4 to 1½ inch and 1½ to 2½ inch coarse aggregates, in proportions as directed by the Engineer, and batched separately.

11. Combined Aggregate.—The combined aggregates including the fine aggregate shall be so graded as to obtain, in the judgment of the Engineer, concrete of maximum density and strength with suitable workability and without the use of an excessive amount of cement. In general, it is expected that the percentage composition by weight will be within the limits in the following tabulation:

Combined Aggregate Grading	Percentage 0 to 2½ in. Aggregate	0 to 1½ in. Aggregate
Passing a 3-in. square opening	100	
Passing a 2½-in. square opening	97 to 100	
Passing a 2-in. square opening	92 to 99	100
Passing a 1½-in square opening	80 to 90	97 to 100
Passing a ¾-in. square opening	62 to 75	70 to 80
Passing a No. 4 sieve	29 to 39	35 to 45
Passing a No. 8 sieve	21 to 30	26 to 35
Passing a No. 16 sieve	16 to 24	19 to 27
Passing a No. 30 sieve	7 to 13	9 to 15
Passing a No. 50 sieve	2 to 5	2 to 6
Passing a No. 100 sieve	0 to 3	0 to 4

12. Storing Aggregates. — Bins and stockpiles shall be so arranged that the various classes of aggregates will be kept completely separate until batched. Aggregates shall be stockpiled or handled in such manner as to avoid separation of the coarser and finer particles.

Care shall be taken that foreign matter caused by passing traffic or by other means does not become mixed with the aggregates. When necessary, roads and detours adjacent to the piles of aggregate shall be kept moist at the expense of the Contractor in order to keep dust from coating the aggregates.

Each of the various aggregates shall have a reasonably uniform and stable moisture content when batched and placed in the mixer. The moisture content of fine aggregate shall not exceed eight per cent (8%) by weight when batched.

At least one hundred and fifty (150) cubic yards of fine aggregate, two hundred and fifty (250) cubic

yards of No. 4 to 1½ inch coarse aggregate, and one hundred (100) cubic yards of 1½ to 2½ inch coarse aggregate shall be stored at the work before beginning each day's concreting.

MEASURING MATERIALS

13. Description.—The several ingredients of concrete, including water, shall be measured separately before being mixed. Uniform proportions of materials in each batch will be positively required with a tolerance of one per cent (1%) for cement and two per cent (2%) for aggregates. All measuring devices shall be furnished by the Contractor, and shall be capable of ready adjustment for changing the concrete mix proportions.

Cement shall be measured by weight, except that cement furnished in sacks as herein specified and measured in even multiples of one sack will be considered as weighing ninety-four pounds (94 lbs.) per sack without further weighing.

Water shall be measured by a water-measuring device satisfactory to and controlled by the Engineer, capable of being locked at any fixed setting and so constructed that the water can be discharged only while the mixer is being charged.

Fine and coarse aggregates shall be measured by weight, except for small isolated structures when, by the special permission of the Engineer, they may be measured by volume, as the Contractor may elect.

When cement or aggregates are measured by weight, the scales shall be consistently accurate, and shall be sealed at the expense of the Contractor as frequently as the Engineer may deem necessary to insure their accuracy. The apparatus for indicating weight shall be readily visible for inspection at all times.

When fine or coarse aggregate is measured by volume, the Contractor shall provide measuring batchers such that the amount of aggregate measured thereby may be readily checked by the Engineer at any time.

MIXING

14. Description.—All concrete shall be mixed in a batch mixer of approved type and capacity which will insure a uniform distribution of the materials throughout the mass so that the mixture will be homogeneous and uniform in color. The mixer shall be equipped with a suitable charging hopper, water storage and water measuring devices and with a device for automatically locking the discharge lever until the batch has been mixed the required time. The mixer shall be cleaned at frequent intervals when in use.

The capacity of the concrete mixer shall be sufficient to provide a uniform operation in the mixing and placing of the concrete, consistent with the required progress of the work, the magnitude of units required to be completed in a continuous operation or placement, and the physical features of the con-

crete section being placed. The volume of the mixed material per batch shall not exceed the manufacturer's rated capacity of the mixer.

The mixing of each batch shall continue not less than one (1) minute for a mixer of one cubic yard or less capacity, and not less than one and one-half (1½) minutes for a mixer of capacity greater than one cubic yard, after all materials are in the mixer and before any part of the batch is released from the mixer. The rate of rotation of the mixer drum shall be such as to insure thorough mixing in the time specified. The entire contents of the mixer shall be discharged before recharging.

Remixing or retempering of concrete, grout or mortar which has appreciably set or hardened shall not be permitted, and such partially hardened material shall be removed from the work.

No concrete shall be mixed while the air temperature is below thirty-six degrees (36°) F. unless adequate means, approved by the District Engineer, are employed to heat the aggregates and water, and unless satisfactory provision is made and carried out for protecting the work. The use of any salt or chemical to prevent freezing will not be permitted.

Placing

15. Description.—Concrete shall be transported from the mixer to the forms and placed in the forms as specified in Section 15, "Concrete Structures."

Damaged or Defective Concrete

16. Description.—Concrete or concrete materials not complying with these specifications in all respects shall be removed from the site of the work without additional compensation therefor.

Concrete damaged by freezing, or from any other cause, or any concrete which shall be found defective in quality or workmanship at any time before the completion and acceptance of the work, shall be removed and replaced with acceptable concrete by the Contractor at his expense, and as directed by the Engineer.

Payment

17. Description.—Portland cement concrete will be measured and paid for as provided under the various items of work in which it is used.

SECTION 14. REINFORCING STEEL

1. Material.—Reinforcing steel shall conform in physical and chemical composition and in method of manufacture to the requirements of the American Society for Testing Materials, Standard Specifications for Billet Steel Concrete Reinforcement Bars, Structural Steel Grade (Serial Designation A 15-30).

All reinforcing steel shall be branded with the maker's brand and the Contractor shall furnish in writing a statement giving the maker's name and the distinctive brand used for identification.

2. Description.—Reinforcing steel shall be of open hearth method of manufacture, structural steel

grade and rolled from new billet stock, and showing no mill scale or rust.

All bars shall be of deformed or corrugated type and shall have the following net sections:

One-quarter inch (¼") round net section	0.05 sq. in.
Three-eighth inch (⅜") round net section	0.11 sq. in.
One-half inch (½") round net section	0.20 sq. in.
One-half inch (½") square net section	0.25 sq. in.
Five-eighths inch (⅝") round net section	0.31 sq. in.
Three-quarters inch (¾") round net section	0.44 sq. in.
Seven-eighths inch (⅞") round net section	0.60 sq. in.
One inch (1") round net section	0.79 sq. in.
One inch (1") square net section	1.00 sq. in.
One and one-eighth inch (1⅛") square net section	1.27 sq. in.
One and one-quarter inch (1¼") square net section	1.56 sq. in.

3. Sampling.—Reinforcing steel will be sampled by the Engineer at the source of supply if within the State of California, and the Contractor shall notify the Engineer in sufficient time before shipment is made to permit sampling and testing. If material is obtained outside the State of California

sampling will be done at the point of distribution within the State. Steel submitted for sampling at mill, warehouse, or upon the work shall be identified by heat or mill number and accompanied by mill analysis and test reports. All test samples shall be furnished by the Contractor without cost to the District. Facilities must be provided for the Engineer, both on the work and at the source of supply, for the sampling of all steel furnished or to be furnished.

4. Cleaning.—Reinforcing steel shall be thoroughly cleaned of all scale, rust, mortar, oil, dirt, or coatings of any character that will tend to destroy or reduce the bond before being placed in the forms.

5. Steel Lists.—Reinforcing steel lists showing full details of cuts and bends shall be submitted in triplicate by the Contractor, at his own expense, to the Engineer for approval. Such approval shall not be construed as relieving the Contractor of full responsibility for the accuracy of details and lists.

6. Bending.—Reinforcing steel shall accurately conform to the dimensions shown on the plans. The radius of bends shall be not less than four times the least dimension of the bar. All bends in field or shop shall be cold bends, and in no case shall the steel be heated for bending or straightening. Bars with kinks or unauthorized bends shall not be used.

7. Placing.—Reinforcing bars shall be accurately shaped, bent, assembled and placed in the forms or position intended, as shown on the plans or as other-

wise authorized. They shall be firmly and securely held in position by wiring at intersections with at least two wraps of No. 16 gauge soft black annealed wire; and by using concrete or metal chairs, spacers, metal hangers, supporting wires and other approved devices, furnished by and at the expense of the Contractor. Metal supports which extend to the surface of the concrete and wooden supports shall not be used. Placing bars on layers of fresh concrete as the work progresses and adjusting bars after concrete is poured will not be permitted.

All spliced bars shall lap over each other not less than forty times the least dimension of the bar and shall be securely wired together in at least two places, having five (5) wraps each of No. 16 gauge soft black annealed wire. Where adjacent bars are spliced, arrangement shall be made to break joints.

Full length bars shall be used wherever possible. Splices in lower longitudinal bars in beams shall be made only at the supports of the beams. Bent up bars shall end as detailed on the plans and shall have no splices. Splices of tensile reinforcement at points of maximum stress shall be avoided.

Bars shall be accurately spaced as shown on the plans. In no case shall the clear distance between parallel bars be less than two inches (2"). The clear space between the face of the concrete and the face of steel shall not be less than one and one-half inches (1½").

No concrete shall be deposited until the Engineer has inspected the placing of the reinforcing steel and given permission to place concrete.

All concrete placed in violation of this provision will be rejected and must be removed at the Contractor's expense.

8. Measurement of Quantities. — Reinforcing steel in place will be paid for by the pound except where specifically provided elsewhere that compensation for furnishing and placing reinforcing steel shall be considered as included in the prices paid for other items of work.

Weights of reinforcing steel shall be calculated on the basis of the following unit weights:

	Pounds per lineal foot
One-quarter inch (¼") round	0.17
Three-eighths inch (⅜") round	0.38
One-half inch (½") round	0.68
One-half inch (½") square	0.86
Five-eighths inch (⅝") round	1.06
Three-quarters inch (¾") round	1.52
Seven-eighths inch (⅞") round	2.07
One inch (1") round	2.70
One inch (1") square	3.44
One and one-eighth inch (1⅛") square	4.35
One and one-quarter inch (1¼") square	5.37

Only reinforcing steel in place, and covered with final concrete will be paid for, and the poundage will be calculated for straight line lengths, no splices

included, except where splices are specifically detailed or called for on the plans.

No poundage will be allowed for clips, tie wires, metal chairs, spacers, hangers, supporting wires or other such devices.

9. Payment.—The price paid per pound for reinforcing steel in place shall include full compensation for furnishing, hauling, transporting, bending and placing all reinforcing steel, furnishing all the tie wire and supporting devices and doing all work necessary or incidental to furnishing and placing reinforcing steel as herein specified or as shown on the plans.

No measurement will be made or separate payment allowed for "Reinforcing Steel" where such steel is specifically included as part of structures or other units of work and paid for as such, as otherwise provided herein.

SECTION 15. CONCRETE STRUCTURES

1. Description.—"Concrete Structures" shall include concrete bridges, buildings, viaducts, headwalls, retaining wall, foundations, footings, tunnel linings, accessory structures or parts thereof, and all work or structures in which either plain or reinforced concrete is used; and the specifications herein contained shall apply, except as modified or otherwise provided for by specific provisions or details set forth for particular structures or work or parts thereof in other parts of these specifications.

Concrete structures shall be constructed to the

lines and grades given by the Engineer and in accordance with the Standard, typical or special designs shown on the plans, including details which may be furnished by the Engineer from time to time during the progress of the construction.

All materials used in concrete structures shall conform to the specifications herein contained for such materials and to any special provisions or details elsewhere herein provided for particular structures or work, or parts thereof. Concrete used in concrete structures shall conform in all respects to the specifications herein for "Portland Cement Concrete."

Foundations

2. Description.—The elevations and shapes of the bottoms of footings, as shown on the plans, shall be considered as approximate only, and the Engineer may order in writing such changes in dimensions or elevations, or shapes of footings, as may be necessary to secure a satisfactory foundation. It is understood and agreed that the determination of the nature, type and depth of footings can be made only as excavation progresses, and the earth or rock structures are exposed, and the Engineer shall have full power and authority to make such changes or alterations in the foundation details as he may deem necessary upon inspection of the excavation and the materials excavated. The Contractor shall have no claim for extra payments other than the unit prices bid for the various units of the work.

The Contractor shall dig test pits before opening up an excavation, or during the process of excavating, if ordered in writing to so do by the Engineer. Material excavated for such purposes shall be paid for as "Structural Excavation" provided that where such test pits become a part of the foundation excavation the material so excavated will be measured and paid for once only, and the Contractor shall not be entitled to any separate or special payment for the separate handling or excavation of such material.

3. Cofferdams and Caissons.—Where cofferdams, caissons, cribbing or other devices are necessary for the proper construction of footings or foundations, the Contractor shall construct the same of such sizes, strength and materials as may be necessary to provide proper clearances and perform the functions for which they are constructed.

The Contractor shall submit to the Engineer for his approval drawings showing the proposed methods and details of such construction, and shall not proceed with such work until details and methods satisfactory to the District Engineer have been furnished; provided, however, that approval by the District Engineer shall not relieve the Contractor of his responsibility under this contract for the successful construction of the work or for any loss or damage which may occur due to methods or types of construction.

No shorings will be permitted in cofferdams or caissons which will induce stress, shock, or vibration

in the permanent structure; cross-struts or bracing below low water may be permitted to extend through foundation concrete only upon written permission of the District Engineer. Such timbers above low water shall be removed, and all volumes displaced by removed timbers shall be filled with concrete of the same mix as the surrounding concrete.

Cofferdams and cribs with all sheeting and bracing shall be removed to the level of the natural ground adjacent thereto by the Contractor at his own expense after the completion of the substructure. The removal shall be effected in such a manner as not to disturb or mar the finished structure.

When conditions are encountered which, in the opinion of the District Engineer, render it impossible to unwater the foundation before placing concrete, the Contractor shall deposit under water, by means of a tremie or bottom dump bucket, a layer of concrete of sufficient thickness to thoroughly seal the cofferdam. This seal shall be allowed to remain in place not less than seven (7) days before unwatering, so as to set sufficiently to withstand the hydrostatic pressure.

After sufficient time has elapsed to insure proper strength in the concrete, the footings shall be unwatered and the remainder of the concrete poured in the dry.

4. Pumping.—Pumping from any foundation shall be performed in such a manner as to preclude the possibility of any portion of the concrete materials being carried away. Pumping will not be

permitted during the placing of concrete, nor for a period of twenty-four (24) hours thereafter, unless it be done from a suitable sump separated by a tight wall from the concrete being poured.

5. Inspection.—No concrete shall be placed in any excavation until the District Engineer shall have approved the depth of the excavation and the character of the foundation material.

6. Payment.—The price paid per cubic yard for "Structural Excavation" shall include full compensation for all cribbing, shoring, bulkheading, caissons and cofferdam construction, sealing and unwatering of foundations and any work incidental thereto, including the removal of such cribbing, shoring, bulkheading, caissons, cofferdam construction, and other accessory structures and any other work, material, labor or equipment made necessary for the proper excavation and preparation of the foundations and footings to construct the concrete substructure.

Concrete placed to seal footings shall be measured and paid for in the same manner as provided for the concrete in the substructure.

Forms and Falsework

7. Forms.—Forms shall be of dimensions and to lines and grades as shown on the plans or as directed by the District Engineer. The design of forms shall be adapted to the structure and shall be satisfactory to the District Engineer. Forms shall be constructed and maintained smooth and tight and

shall be substantially built and securely tied and braced to prevent any movement or deflection during the placing of concrete. Forms for the tunnel lining shall be of steel. Well matched lumber or steel shall be used for forms for all other structures or parts thereof.

Forms shall be of sufficient strength to carry the dead weight of the concrete as a liquid without deflection, and, if any deflection occurs, it shall be sufficient cause for the rejection of the work. In general, wooden sheathing for all outside surfaces above the permanent surface of the ground shall be worked from one inch (1") by eight inch (8") or one inch (1") by six inch (6") stock with edges rabbetted to form a lap siding. The material shall be S1S 2E Douglas Fir lumber, free from defects that will result in unsatisfactory concrete structures. Outside surfaces as herein intended shall include the faces of wing walls and abutments above ground slopes, the faces of piers extending beyond the outside of outside girders or arch rings, the outside surfaces of outside girders and arch rings, the surfaces of copings, parapets and curbs, and all surfaces seen in side elevation. Except where otherwise directed by the District Engineer, the rough side of the lumber shall be applied against the concrete.

All sharp edges shall be chamfered with one inch (1") by one inch (1") triangular fillets, unless otherwise shown on the plans or directed by the District

Engineer. Curved surfaces where steel forms are not used shall be formed of elementary strips not over four inches (4″) wide and of well matched lumber. On parapet forms the workmanship shall be equivalent to first class pattern work. Where necessary, in the opinion of the District Engineer, to make a perfect mold, forms shall be oiled or shall be painted if the District Engineer requires, with one coat of white shellac before being used.

Forms shall be constructed so that portions, where finishing is required, may be removed without disturbing other portions.

When ties extending through the concrete are used to support or strengthen forms, they shall be so constructed and so removed that no tie other than metal will be left in the concrete, and that no metal tie which extends within one inch (1″) of any concrete surface which will be exposed to view or to weather shall be left in the concrete.

Forms shall be thoroughly wet or oiled inside and outside immediately before concrete is to be placed, and all excess water shall be drained away. All dirt, chips, sawdust and other foreign matter shall be removed before any concrete is deposited. Lumber which has been previously used for forms shall be thoroughly cleaned before again being used.

Complete forms shall not extend more than five feet (5′) above concrete previously laid or being laid except by permission of the District Engineer. Forms shall be so constructed that free access can

be obtained to them to permit proper spading, working and tamping of the concrete.

Forms and falsework supporting concrete beams, slabs or other members subject to direct bending stress, or forms or falsework supporting any loads shall be left in place at least twenty-one (21) days unless otherwise permitted by the District Engineer. At time of low temperature of other adverse conditions, the District Engineer may increase the time before forms or falsework may be removed, if, in his judgment, this seems necessary. Vertical or side forms not supporting loads shall be left in place from two (2) to five (5) days. Such forms shall be so constructed that they may be removed without disturbing load-resisting forms. No forms or falsework shall be removed until the proposed removal is approved by the District Engineer.

8. • Falsework.—The Contractor shall provide a substantial system of falsework which will not deflect or sag during the process of placing concrete, and which can be taken down and removed without jar or vibration to the structure. Falsework shall be supported on posts, piles, columns or footings adequate to support safely the loads to be imposed without deformation or settlement. Where wedges are used to bring forms or falsework to exact position and elevation, they shall be used in pairs to insure uniform bearing. Laminated sections will not be permitted.

Where danger exists during the construction period from flood waters or overflows, footings and

posts shall be set deep enough in the ground to prevent undermining and the Contractor shall assume all risks as to safety, stiffness and adequacy of falsework and supports used on the work.

The Contractor shall furnish to the District Engineer for approval, plans of staging and falsework to be used on the work. The approval of the District Engineer shall not relieve the Contractor of his full responsibility for the accuracy of dimensions, details and strength of falsework, or of the safety of the structure during construction, and the Contractor shall be responsible for any injury or damage arising from inadequate forms or falsework or from the premature removal of forms or falsework.

9. Payment.—No separate charge or payment shall be made for the construction and removal of forms or falsework, but the price paid for Portland Cement Concrete in the structure shall include full compensation for the construction and removal of forms and falsework, and for all work incidental thereto.

Placing Concrete

10. Time and Rate of Placing.—No concrete shall be placed unless an authorized representative of the Engineer is present, and the Contractor shall give ample notice to the Engineer as to the time he intends to start the placement. Where continuous placement is called for by the specifications or plans, the Contractor shall satisfy the Engineer that all

provisions for such placement is adequate and complete before starting the work.

Parts of each structure which depend upon each other for strength shall be cast at the same time. Slabs, girders and floor beams shall be placed continuously as a single unit, without stopping the work for more than thirty (30) minutes. Where caps, girders or other projecting members are to be placed against or over columns or walls, the concrete in the columns or walls shall have been permitted to set at least one (1) hour before the superstructure is placed, in order that the column or wall concrete may have opportunity to settle in the forms.

Concrete for the tunnel lining shall be placed continuously between any two (2) adjacent construction joints, in lifts not more than six feet (6′) deep, measured in a vertical direction. The topmost lift, having a width not to exceed eight feet (8′), shall not be placed until the adjoining concrete on both sides has been in place for at least seven (7) days, unless otherwise directed by the District Engineer.

All concrete shall be used while fresh and before it has taken an initial set. Concrete shall not be used after more than thirty (30) minutes have elapsed from the time water was first brought into contact with the cement.

11. Preparation of Forms and Surfaces.—All surfaces on or against which concrete is to be placed

shall be clean and free from debris. Immediately before placing concrete on any horizontal surface, except pavement subgrade or footings, the surface shall be covered with a layer at least one-half inch (½") thick of plastic mortar consisting of one (1) part of cement to two and one-half (2½) parts of sand by weight. The mortar shall be thoroughly worked with brooms or otherwise into all irregularities of surface, and concrete shall then be placed upon the fresh mortar.

All concrete surfaces upon or against which concrete is to be placed and to which new concrete is to adhere, shall be roughened and wetted before placing concrete or mortar upon or against them, in a manner satisfactory to the District Engineer. All laitance and all loose or defective surface material shall be removed by thorough chipping, brushing, and washing with clean water or cleaning with air under pressure, and no new concrete or mortar shall be placed until all excess material and water have been removed.

Water shall be removed from excavations before concrete is deposited. Water shall be prevented from entering any excavation while concrete is being placed or while it is setting, and shall be conducted away in such a manner that the concrete shall be placed in the dry. All drainage and pumping shall be at the expense of the Contractor. No concrete shall be deposited in or under water except with the written consent of the District Engineer and approval by him of the method to be used.

12. Conveying, Placing and Compacting Concrete.—Concrete, when mixed, shall be immediately conveyed to the forms and deposited without separation of its ingredients. The use of open chutes to convey and deposit concrete will not be permitted, except for distances of less than twenty feet (20′), and then only by special permission of the District Engineer. When open chutes are used, they must be of such cross-section and laid at such inclination that they will permit the flow of concrete of the consistencies herein specified, without the use of additional water to promote free flow. Only methods of transporting and placing which will deliver concrete of specified consistency without separation of its ingredients will be permitted.

Concrete shall not be permitted to fall from a height greater than six feet (6′), except through an enclosing pipe, in which case the height of fall shall not exceed twelve feet (12′). An enclosing pipe may be required by the District Engineer for placing concrete in columns, walls and deep footings.

Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than three feet (3′) in a horizontal direction. Care must be taken not to displace the reinforcement, pipes, anchor bolts or other devices which are to be embedded in the concrete.

Concrete shall be deposited in uniform horizontal layers, not deeper than twelve inches (12″), care being taken to avoid inclined planes or inclined con-

struction joints. Construction joints must be built with square ends and level tops, except as otherwise directed by the District Engineer; in arch type structures, joints shall be made at right angles to the axis of the rib. Each layer shall either be placed before the previous layer shall have taken its initial set, or, if the previous layer has taken its initial set, the surface of the previous layer shall be prepared as herein specified for the preparation of hardened surfaces.

As the concrete is placed in the forms, it shall be thoroughly compacted by means of internal vibratory tampers of a type satisfactory to the District Engineer. The vibratory tamper shall be inserted directly into the concrete in the forms and shall not be attached to either the inside or the outside of the forms, nor shall it be attached to the reinforcing steel in any manner. The vibratory tamper shall have sufficient power to thoroughly compact all concrete of the consistencies herein specified.

The compaction shall be produced by inserting the tamper into the concrete directly for a period sufficient to produce the specified compaction. This insertion shall occur approximately every two and one-half feet (2½′), or where necessary to produce concrete of maximum density. Continuous attention shall be given to the working of concrete next to the forms and around reinforcing steel and embedded fixtures or inserts, in such a manner as to

produce a dense, homogeneous concrete mass, filling all corners and angles of the forms, thoroughly embedding the reinforcement and embedded fixtures, eliminating rock pockets and bringing a slight excess of mortar to the exposed surfaces of concrete during placement. The Contractor shall furnish and use at least one (1) vibratory tamper for every twenty-five (25) cubic yards of concrete placed per hour, and shall keep spare units in reserve. All concrete shall be completely compacted within fifteen (15) minutes after depositing the concrete in the forms. The furnishing and use of vibratory tampers shall be at the expense of the Contractor and no extra payment shall be made therefor.

Concrete for pavements will not be required to be compacted by the vibratory process above specified for all other concrete, but shall be compacted and the surface finished as specified in Section 16, "Portland Cement Concrete Pavement." Concrete for sidewalks, curbs and gutters will not be required to be compacted by the vibratory process above specified for all other concrete, but may be compacted by tamping as specified in sections 18 and 19.

In placing and compacting concrete, the Contractor shall use every means to secure a dense, impervious, homogeneous concrete, free from voids or pockets. The Contractor shall furnish, in addition to other concrete workers and vibratory tamper operators, sufficient laborers, acting under the direction of a foreman, whose sole duties during the

placing of concrete shall be the working, agitating and compacting of the deposited concrete with suitable tools of an approved type. Portions next to forms shall be cut in with spades or wedge-shaped tampers to secure a smooth external surface.

13. Construction Joints. — Construction joints necessitated by the temporary or diurnal cessation of placing concrete shall be located and constructed to the satisfaction of the District Engineer so that weakness in the finished structure will not result. Joints shall be keyed where required by the District Engineer. Where keys are required by the District Engineer, they shall be of sufficient area to transmit all shear on the section; in no case shall the area of keys be less than twenty-five per cent (25%) of the cross-sectional area of the section. Keys shall be formed by beveled strips or boards at right angles to the direction of shear and shall be at least one and one-half inches (1½") in depth.

Before placing new concrete at construction joints, the hardened surface against which concrete is to be placed shall be prepared as herein specified, and concrete shall be placed against such joints as herein specified.

Protection and Curing

14. Description.—All fresh concrete shall be carefully protected from the weather and from direct sunlight. Except as otherwise specified herein or permitted by the District Engineer, all concrete shall be cured by keeping the surface continuously

moist for at least twelve (12) days after placing. Floor slabs and roadway slabs shall be kept moist by means of damp burlap. Forms for all other concrete shall be kept wet for at least twenty-four (24) hours after placing concrete, and, when forms are removed, the concrete shall be kept sprinkled or kept protected by damp burlap hangings, except during the actual finishing of the surface, until the concrete is at least twelve (12) days old.

Except where otherwise directed, the surface of the concrete in the tunnel lining shall be protected by means of a waterproof coating satisfactory to the District Engineer. The coating shall consist of an approved asphaltic emulsion which will harden readily and quickly after it has been applied to the concrete surface. Such coating shall be applied immediately upon removal of forms, under pressure by means of a spray nozzle or atomizer in such a manner as to cover the entire surface with a uniform film and in sufficient quantity to thoroughly seal the surface of the concrete.

The Contractor shall protect all concrete from injury until it is thoroughly set, and all concrete surfaces from injury at all times. Working or walking on concrete shall not be permitted for at least twenty-four (24) hours after it has been deposited and compacted.

Finishing Concrete Surfaces

15. Description.—Forms on all vertical surfaces which do not act as supporting members shall be

removed as soon as practicable, but not sooner than forty-eight (48) hours after concrete is poured. The District Engineer shall be the sole judge as to which parts of the forms constitute supporting members.

Immediately after the forms have been removed, the Contractor shall remove all form bolts and ties to a depth of at least one inch (1") below the surface of the concrete. The holes shall then be carefully cleaned out and filled with a mortar containing one (1) part cement to two (2) parts of sand, and the surface shall be rubbed smooth. Care shall be taken to obtain a perfect bond with the concrete and to obtain the same color in the mortar as in the surrounding concrete.

Voids, air holes or rock pockets shall not be pointed up until inspected by the District Engineer. If, in his judgment, rock pockets or holes are of such an extent and character as to materially affect the strength of the concrete, or endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal of the entire member or part, together with adjacent members, if such members act with the member or part containing the defective concrete. The whole shall then be recast with first class and acceptable concrete at the expense of the Contractor.

Where voids, air holes or rock pockets are not of an extent or character, in the opinion of the District Engineer, to endanger the strength or life of the structure, they shall be cleaned out and the

space refilled with concrete or cement mortar, held in place by forms, if necessary. The District Engineer may require that rock pockets be pressure grouted in the manner specified herein. All pockets containing voids shall be entirely removed until solid concrete is reached. The edges of the concrete shall be cut away square and true, and the old concrete saturated with water before refilling with the mortar.

All fins caused by form joints, and other projections, shall be removed.

All repairs and patches shall be rubbed down until smooth and flush with adjacent surfaces. Care shall be taken to obtain perfect bond and to obtain the same color in the patches as in the surrounding concrete.

After the completion of the above patching in a manner satisfactory to the District Engineer, all surfaces, except those poured against earth and surfaces such as pavement, sidewalk and others for which special surfacing methods are specified, shall be finished as follows: The entire surface shall be thoroughly rubbed with coarse carborundum stones and all unsightly blemishes and irregularities removed. If a mechanical finisher is used, a period of not less than four (4) days shall elapse between the pouring of the concrete and the start of the finishing. The operation shall be performed and continued until a smooth even surface of uniform texture and appearance is obtained, satisfactory to

the District Engineer. The surface shall then be washed with water to remove stains and loose particles.

Roadway surfaces, curbs and sidewalk shall be finished in accordance with specifications herein contained in, Section 16 "Portland Cement Concrete Pavement," Section 18 "Concrete Curbs and Gutters" and Section 19 "Cement Sidewalks," respectively, except that lampblack or other color admixtures shall not be used unless directed by the District Engineer.

Where special finishes are elsewhere provided, or called for, such finishes shall be applied only after all patching and rubbing down as herein set forth has been completed to the satisfaction of the District Engineer.

16. Grouting.—Where deemed necessary by the District Engineer, the seams and cavities in rock adjacent to the tunnel lining shall be grouted by a pressure method, satisfactory to the District Engineer. Grout holes shall be drilled to the depth directed by the District Engineer, and shall be not less than one inch (1") in diameter at the bottom. Suitable grouting connections in the form of two inch (2") iron pipe, eighteen inches (18") to twenty-four inches (24") long, shall then be installed, anchored, and packed to prevent leakage around the connection. If required by the District Engineer, each grout hole shall be tested prior to grouting by having first applied to it clear water

under pressure. Each grout hole and grout connection shall have forced into it under a pressure as directed by the District Engineer, but not exceeding one hundred and fifty (150) pounds per square inch, a grout composed of cement and water, or cement, sand and water, in proportions determined by the District Engineer. Sand for pressure grouting shall meet all requirements for concrete sand specified herein except as to grading, which shall be as follows:

One hundred per cent (100%) shall pass a No. 8 sieve, and twenty per cent (20%) to thirty-five per cent (35%) shall pass a No. 50 sieve.

Cement for pressure grouting shall conform to the requirements herein specified for Portland Cement.

The apparatus for mixing and placing grout shall be of a pumping type approved by the District Engineer and capable of effectively and continuously mixing and stirring the grout and forcing it into the holes at any desired pressure up to one hundred and fifty (150) pounds per square inch. Grouting shall not be stopped in any hole until directed by the District Engineer. After the grouting of the hole is finished, the pressure shall be maintained by means of a stop-cock or other suitable device until the grout has set sufficiently so that it will be retained in the hole.

If ground is supported by steel ribs and liners, spaces behind the steel shall be grouted prior to

placing the tunnel lining. Grout as herein specified for grouting rock shall be forced into the space behind the steel, as directed by the District Engineer, under pressure not exceeding twenty-five (25) pounds per square inch.

Any unfilled space above the crown of the tunnel arch which remains after concrete is placed, or any space behind the tunnel lining which cannot be filled with concrete as intended shall be grouted by a pressure method satisfactory to the District Engineer, and such grouting shall be done at such times after placing concrete as the District Engineer may direct. Grout and grout materials, and methods of mixing and placing, shall be as herein specified for grouting rock.

For the purpose of introducing grout through the arch, a grout pipe system consisting of one inch (1") risers at intervals of approximately ten feet (10') shall be installed prior to the time the concrete is placed. The upper end of such risers shall be wrapped with burlap and wire in such a manner that concrete will not enter the risers during placement, but that grout will be forced from the riser into the space above the arch when pressure is applied. After grouting is completed, and the grout has thoroughly set, the one inch (1") pipe risers shall be removed to a depth of at least one inch (1") back of the concrete surface, and the space thus formed filled with 1:2½ mortar, carefully troweled to a smooth finish with the tunnel lining.

Full compensation for grouting shall be considered as included in the price paid for "Tunnel Construction" as specified in Section 32 hereof, and no additional allowance will be made therefor.

Contraction Joints

17. Description. — Expansion and contraction joints are to be constructed as shown on the plans or determined by the District Engineer. Joints to be filled with asphalt shall be carefully cleaned out and filled with asphalt having a penetration of from one hundred and seventy-five (175) to two hundred and twenty-five (225). Full compensation for constructing and filling expansion and contraction joints, as herein specified, shall be considered as included in the prices paid per cubic yard for concrete in structures, and no additional allowance will be made therefor.

Drains and Weep Holes

18. Description.—Drains back of and weep holes through walls and tunnel lining shall be provided as shown on the plans or as directed by the District Engineer. Drains shall be constructed in accordance with specifications in Section 23, "Underdrains," except as otherwise shown on the plans or directed by the District Engineer.

For all walls, the price paid per cubic yard of concrete in place shall include full compensation for the furnishing and placing of all weep holes and drains as above specified. For the tunnel, the price

paid per lineal foot for "Tunnel Construction," Section 32 shall include full compensation for the furnishing and placing of all weep holes and drains as above specified.

Lighting Conduit

19. Description.—Conduit for lighting equipment shall be galvanized or sherardized both inside and outside and shall be of the size called for on the plans. At expansion joints, where the conduit passes through diaphrams or brackets, a zinc sleeve shall be placed about the conduit and oiled or otherwise treated to prevent adhesion to the concrete. The length of conduit between junction boxes shall not exceed seventy feet (70'); wooden plugs shall be inserted in all open ends of conduits to prevent plugging.

Full compensation for furnishing and placing conduits with all necessary fittings and incidental work connected therewith shall be considered as included in the prices paid for other items of work and no additional allowance will be made therefor.

Concrete Parapets

20. Description.—Special care shall be taken to construct parapets true to line and grade. Where the top of the parapet is to be a vertical curve, no broken lines shall appear. Panels shall be straight and true. Parapet forms shall be of selected matched lumber and framing shall conform to best cabinet or pattern work practice. The inside of

forms shall be oiled or painted with a coat of white shellac as the District Engineer may direct. Perceptible breaks in the lines or parapets will be sufficient cause for removal and rebuilding at the Contractor's expense.

21. Payment.—Actual concrete in the finished structure, as shown on the plans, with such modifications as the District Engineer has directed in writing, will be paid for.

The price paid per cubic yard for "Concrete Structures" shall include full compensation for furnishing, placing and removing forms and falsework, furnishing, placing, finishing and curing concrete, furnishing and placing expansion details, and all work necessary or incidental thereto. No allowance will be made for cofferdams, pumps, labor, or other items which may be necessary on account of water.

Tunnel lining will be paid for as hereinafter provided, and no other payment for separate units thereof will be made.

Reinforcing Steel will be paid for as provided under Section 14, "Reinforcing Steel."

No measurement will be made or separate payment allowed for "Concrete Structures" where such concrete is specifically included as part of structures or other units of work and paid for as such, as otherwise provided herein.

SECTION 17. PENETRATION OIL MACADAM PAVEMENT

1. Description.—A Penetration Oil Macadam Pavement shall be constructed at locations and of

widths shown on the plans, and as directed by the District Engineer. The pavement shall consist of two (2) courses, namely, a waterbound base course consisting of rock and screenings, compacted by rolling and watering and of a depth not less than six inches (6") after final compacting, and a penetration oil macadam top course two inches (2") in thickness after compacting, consisting of rock and screenings compacted by rolling and bound and sealed by applications of hot road oil or cold emulsified road oil, as hereinafter specified.

2. Waterbound Base Course: (a) Materials.—The broken stone for the waterbound base course shall be crushed from sound ledge rock or boulders, of such character that it will compact and thoroughly lock under watering and rolling so as to make a stable, well keyed base. The rock shall be free from clay, loam, adobe, vegetable matter or other deleterious material. It shall have a coefficient of wear of not less than eight (8) when tested in the manner hereinafter set forth for "Abrasion Test of Rock." It shall be of such size that it will all pass a screen having circular openings three inches (3") in diameter and at least ninety-five per cent (95%) will pass a screen having circular openings two and one-half inches (2½") in diameter; not more than seventy per cent (70%) will pass a screen having circular openings two inches (2") in diameter and at least ninety-five per cent (95%) will be retained on a screen having circular openings one and one-quarter inches (1¼") in diameter.

Screenings shall be that portion of the crusher run, including stone dust, which passes a screen having circular openings three-quarters inch (¾") in diameter. Screenings shall be obtained from rock of the same qualities as hereinabove specified for broken stone.

(b) Constructing Base.—The broken stone shall be placed upon a subgrade prepared as hereinbefore specified, and between side forms or headerboards set to line and grade for the edges of the finished pavement. If curbs and gutters are to be placed they shall be constructed prior to the placing of the rock, and headerboards shall be omitted.

The broken stone shall be placed in two courses, each course not to exceed four inches (4") in thickness, measured before rolling. Work on each course shall be handled in a similar manner.

The broken stone shall be spread in a layer of uniform thickness, using either spreading boxes, self-spreading vehicles, or by spreading from the vehicle by hand. Dumping in piles upon the subgrade will not be permitted. The course shall be rolled with a self-propelled roller weighing at least three hundred (300) pounds to the linear inch width of tread, and rolling shall be done at the sides of the roadway first, gradually working toward the center, until the entire surface is compact and the broken stone thoroughly locked and keyed. Screenings shall then be spread in thin layers and each layer rolled dry until no more screenings can be forced into the voids. The surface shall then be

inkled until the stone is thoroughly wet but not ficiently to saturate the subgrade, and again led. Excess screenings shall be scattered by light eeping, additional screenings shall be added as l where voids develop, rolling and sweeping shall continued until the entire surface is completely ed and the course is firm and unyielding. The face shall be swept to remove all surplus screen- s to slightly below the surface of the compacted k.

The succeeding course shall be constructed in the ntical manner and the finished water-bound base rse shall be firm and hard, and true to grade and tion. If the surface varies at any place more n one-quarter inch (¼") from the lower edge of en foot (10') straight-edge it shall again be trued and rerolled. This process shall be repeated il the surface conforms to the above test for uracy.

. Penetration Oil Macadam Top Course.—Using road oil.

a) Materials—Rock and Stone.—The broken ne for the penetration oil macadam top course ll be crushed from sound ledge rock or boulders, l shall be sound, hard, tough and have irregular avage. It shall be of such a character that it will roughly compact and lock when rolled. It shall free from clay, loam, adobe, vegetable matter or er deleterious material. It shall have a coeffi- nt of wear of not less than ten (10) when tested the manner hereinafter set forth for "Abrasion

Test of Rock." The large size rock shall be such that all will pass a screen having circular openings two and one-half inches (2½") in diameter; not more than seventy per cent (70%) shall pass a screen having circular openings two inches (2") in diameter and all shall be retained on a screen having circular openings one and one-quarter inches (1¼") in diameter.

The intermediate size rock shall be of the same quality as the broken stone and shall be of such size that at least ninety-five per cent (95%) will pass a screen having circular openings one and one-quarter inches (1¼") in diameter and at least ninety-five per cent (95%) will be retained on a screen having circular openings three-quarters inch (¾") in diameter.

Stone chips shall be crushed from broken stone of the quality above described and shall be of such size that all will pass a screen having circular openings three-quarters inch (¾") in diameter and be retained on a screen having circular openings one-quarter inch (¼") in diameter. Clean, hard, durable pea gravel passing the same screen tests may be used in place of stone chips.

(b) Materials—Road Oil.—The road oil shall be made from an asphaltic base oil; it shall be either a naturally homogeneous oil or a homogeneous residue from oil. It shall not have been distilled at a temperature high enough to injure by burning or to produce flecks of carbonaceous matter, and upon

arrival at the work shall show no signs of separation into lighter and heavier components.

Oil must be delivered at the point required for spraying at a temperature of not less than three hundred and fifty degrees (350°) F. nor more than four hundred and thirty-five degrees (435°) F.

In determining the quantity of oil delivered the correction for expansion by heat shall be made as follows: From the measured volume of oil received at any temperature above sixty degrees (60°) F. an amount equivalent to four-tenths (4/10) of one per cent (1%) for every ten degrees (10°) above said sixty degrees (60°) F. shall be subtracted as the correction for expansion by heat. For the purpose of measuring the oil a temperature of sixty degrees (60°) F. shall be deemed normal temperature.

The oil shall conform to the following tests:

1. Penetration.—The oil shall contain a minimum of ninety-four per cent (94%) of asphaltic residue of eighty (80) penetration (Test D 243-26T A.S.T.M.).

2. Flash Point.—The flash point by the Cleveland Open Cup method shall be not less than four hundred twenty-five degrees (425°) F. (Test D 92 A.S.T.M.).

3. Volatibility.—The loss on heating at three hundred and twenty-five degrees (325°) F. for five hours shall not be more than three per cent (3%). The residue at seventy-seven degrees (77°) F. shall have a penetration of not less than sixty (60); (Test D-6 A.S.T.M.).

4. Solubility.—The bitumen shall be not less than ninety-nine per cent (99%) soluble in carbon bisulphide (Test D-4 A.S.T.M.). The solubility in carbon tetrachloride shall be not less than ninety-nine and five-tenth per cent (99.5%) of the amount soluble in carbon bisulphide (Test D-165 A.S.T.M.).

5. The oil shall contain not more than five-tenths per cent (0.5%) of water nor more than one per cent (1%) of sediment (Tests D-95 and D-96 A.S.T.M.).

(c) Constructing Pavement.—Upon the water-bound base course, thoroughly cleaned, broomed and dry, shall be laid a layer of the broken stone of the large size to a uniform depth sufficient so that when the intermediate rock and rock chips have been added and the whole compacted, the finished surface will be true to grade and cross-section. The broken stone shall be placed by means of spreading boxes or other devices, approved by the District Engineer. It shall then be thoroughly rolled until it is firm, uniform, to the required cross-section, and the stone interlocked and thoroughly keyed.

The hot oil shall then be applied uniformly over the surface at the rate of seven-eighths (⅞) gallon per square yard of street surface covered. The oil shall be applied under a pressure of at least thirty (30) pounds per square inch. Suitable appliances shall be used which shall be capable of spraying the pavement in strips at least eight feet (8′) wide; and shall, in addition to having the necessary nozzles for spraying such strips, be equipped with a hose

and attached spraying nozzle for the purpose of spraying portions of the pavement inaccessible to the regular oiling nozzles.

Immediately after applying the oil a layer of intermediate size rock shall be spread over the surface in sufficient quantity to permit rolling without adhesion of the oil to the roller. The surface shall then be immediately rolled, broomed, and all lumps broken up and distributed. The rolling shall continue with the application of stone chips and brooming, as required, until the surface is thoroughly compacted and bonded, true to section and grade.

The hot oil shall then be uniformly applied over the surface at the rate of three-eighths (⅜) gallon to the square yard of street surface covered, then covered with stone chips and rolled, with stone chips added as necessary until the surface is uniform and firm.

Rolling shall be done with a self-propelled roller, weighing at least three hundred (300) pounds to the linear inch width of tread.

All rolling shall progress from the sides of the roadway gradually toward the center.

All oiling shall be done while the atmospheric temperature is above sixty-five degrees (65°) F. or when the sun is shining. No oiling will be permitted when the layer of broken stone or the stone chips are wet.

Stone chips and intermediate size rock shall be spread by mechanical spreaders, or shall be depos-

ited along the sides of the street in piles, and distributed and placed from there with shovels. Stone chips and rock shall not be dumped on the top course in piles.

No traffic shall be permitted upon the roadway between the time of spreading the broken stone and the time of completion of the last oiling and rolling, excepting the oil spraying appliance during its operation.

4. Penetration Oil Macadam, Top Course.—Using Emulsified Road Oil:

(a) Materials—Rock and Stone.—The broken stone for the top course shall be crushed from sound ledge rock or boulders, and shall be sound, hard, tough and have irregular cleavage. It shall be of such a character that it will thoroughly compact and lock when rolled. It shall be free from clay, loam, adobe, vegetable matter or other deleterious material. It shall have a coefficient of wear of not less than ten (10) when tested in the manner hereinafter set forth for "Abrasion Test of Rock." It shall be of such size that all will pass a screen having circular openings two and one-half inches (2½") in diameter; not more than seventy per cent (70%) shall pass a screen having circular openings two inches (2") in diameter, and all shall be retained on a screen having circular openings one and one-quarter inches (1¼") in diameter.

Screenings used for key rock shall be of the same quality as broken stone and shall be of such size that not less than ninety per cent (90%) will pass

a screen having circular openings one inch (1") in diameter; not more than seventy-five per cent (75%) will pass a screen having circular openings three-quarters inch (¾") in diameter and not more than five per cent (5%) will pass a ten (10) mesh sieve.

Rock chips will be crushed from rock of the same quality as the broken stone, or clean, hard, uncrushed pea gravel may be used in place of crushed rock. Rock chips shall be of such a size that not less than ninety-five per cent (95%) will pass a screen having circular openings three-eighths inch (⅜") in diameter, and not more than five per cent (5%) will pass a ten (10) mesh sieve.

(b) Materials — Emulsified Road Oil. — The Emulsified Road Oil shall consist of petroleum asphalt, slightly alkaline water and an emulsifying agent. It shall be uniformly emulsified and shall break rapidly when applied to the rock. It shall be of a consistency suitable for application through a pressure distributor without heating, and, when tested in accordance with the methods herein described, shall conform to the following requirements:

Specific Gravity 25° C. (77° F.)_____
_____Not less than 1.00
Viscosity, Saybolt-Furol 60 CC at 25° (77° F.)
_____Not more than 45 seconds
Loss at 163° C. (325° F.) 3 hrs. 200 grams___
_____Not more than 45%
Petroleum Asphalt_____Not more than 55%

Total amount of all alkali and saponifiable substances, including Petroleum acids_____
_____Not more than 1%
Settlement 10 days_____Not more than 3%
Free asphalt, retained on forty (40) mesh sieve
_____Not more than 0.05 of 1%

The petroleum asphalt contained in the emulsion shall conform to the following requirements:

Percentage 80 penetration asphalt_95% to 98%
Solubility in carbon tetrachloride_____
_____Not less than 98.5%
Solubility in carbon disulphide_____
_____Not less than 99%

The methods of testing Emulsified Road Oil shall be as follows:

Specific Gravity—A. S. T. M. Standard D 70-27.

Viscosity—A. S. T. M. Standard D 88-30.

Loss at 163° C.—A. S. T. M. Standard D-6-30, except that determination of loss shall be the average of three (3) gram samples, heated for three (3) hours in a porcelain evaporating dish six inches (6") in diameter and about two inches (2") in depth.

Amount of Saponifiable Substances—Including petroleum acids, soaps, fatty or resinous acids and sulphonated oils in accordance with Test Method 37 E, as described on page 753 of the Third Edition of "Asphalt and Allied Substances" by Abraham.

Settlement.—An average sample of one (1) gallon or more shall be taken from each lot or shipment and tested for stability. Samples shall be shipped in clean, air-tight containers. A determination of the amount of residue, based on the average of two (2) tests, shall be made on this sample, in accordance with the test for "Loss at 163° C."

Two (2) samples of five hundred (500) cubic centimeters each from the average sample shall be placed in air-tight, cylindrical glass containers with an inside diameter of four (4) to five (5) centimeters and allowed to stand for ten (10) days at laboratory atmosphere temperature. Fifty (50) grams shall then be siphoned from the top of each sample, care being taken not to disturb the remainder of the content. Approximately four hundred (400) cubic centimeters of the emulsion shall then be removed with the siphon and finally a fifty (50) gram sample shall be taken from the bottom of each container. The samples taken from the top and from the bottom of the container shall then be tested in the same manner as the original sample.

Neither the average per cent of the residue from the top samples nor the average per cent of the residue from the bottom samples shall differ from the average per cent of residue obtained in the test on the original sample by more than three per cent (3%).

Free Asphalt—Retained on Forty (40) Mesh Sieve.—The Standard forty (40) mesh sieve shall consist of a copper cylinder one and one-half inches (1½") in diameter and two inches (2") high, to the

bottom of which is soldered a copper standard forty (40) mesh wire screen. The test shall be carried out as follows:

The lower half of the weighed sieve shall be dipped into distilled water and the excess water drained off. The emulsion to be tested shall then be poured through the sieve until no more will go through or until eight hundred (800) to one thousand (1,000) CC have passed through. The emulsion adhering to the sieve shall be immediately washed off with distilled water until the washings come through clear. The sieve and free asphalt thereon shall then be dried for one and one-half hours at a temperature of one hundred and fifteen degrees (115°) Centigrade. The percentage of free asphalt is then determined from the weight of the emulsion passed through the sieve and the weight of the asphalt retained on the sieve. The small amount of the emulsion washed off from the sieve will be neglected.

The methods of testing the Petroleum Asphalt contained in the Emulsion shall be as follows:

Penetration ..... A.S.T.M Standard D-5-25

Solubility Carbon Disulphide ..... A.S.T.M. Standard D-4-27

Loss at 163° C ..... A.S.T.M. Standard D-6-30

Flash Point (Open Cup) ..... A.S.T.M Standard D-92-24

Percentage 80 Penetration Asphalt ..... A.S.T.M. Standard D 243-26T

(c) Constructing Pavement.—Upon the water-bound base course, thoroughly cleaned and broomed, shall be spread a layer of the broken stone to a uniform depth sufficient so that when the key rock and screenings have been added and the whole has been compacted the finished surface will be true to grade and cross-section. The broken stone shall be placed by means of spreading boxes or devices approved by the District Engineer. It shall then be lightly rolled, after which all high or low spots shall be trued up by removing or adding stone as required. It shall then be rolled again and trued up where necessary. These operations shall be repeated until a uniform surface free from high or low spots is secured, and the broken stone is locked and keyed together. Rolling shall be done with a self-propelled roller weighing at least three hundred (300) pounds to the linear inch width of tread.

The rock chips as specified shall then be evenly spread mechanically with an approved spreading device or broadcast with a sideswing of the shovel and then lightly rolled and broomed until worked down between the rock. Filling shall extend to within one inch (1") of the surface.

The Emulsified Road Oil shall then be uniformly applied over the surface at the rate of five-eighths (⅝) gallon per square yard of street surface covered. The oil shall be applied under a pressure of at least thirty (30) pounds per square inch. Suitable appliances shall be used which shall be capable of spraying the pavement in strips at least eight

feet (8') wide, and shall, in addition to having the necessary nozzles for spraying such strips, be equipped with a hose and attached spraying nozzle for the purpose of spraying portions of the pavement inaccessible to the regular oiling nozzles.

After the Emulsified Road Oil shall have been completely broken and shall have adhered to the rock, the surface shall be rolled once over. Screenings shall then be spread uniformly in sufficient quantity to completely fill the remaining voids. The screenings shall be broomed and dragged to aid in uniform distribution and shall then be rolled. Additional screenings, if required, shall be applied and rolling, brooming and dragging shall continue until the voids in the coarse rock are filled and the key rock is thoroughly locked in the surface.

The second application of emulsified road oil shall then be made at the rate of one-half (½) gallon per square yard to street surface covered. After the emulsion in this application has broken and adhered to the stone the pavement shall be rolled once over and shall then be covered with rock chips applied at the rate of about fifteen (15) pounds per square yard of pavement surface. The rock chips shall then be broomed and dragged to every portion of the surface to obtain uniform distribution and complete filling of the voids. Rolling shall continue during the brooming process and until the pavement is thoroughly and uniformly compacted.

At least twelve (12) hours shall elapse between the first and second applications of the emulsified road oil.

A seal coat shall be applied in not less than twenty-four (24) hours nor more than seven (7) days after the completion of the work previously set forth. All loose material and loose rock chips remaining on the surface shall be removed by brooming. Emulsified Road Oil shall be applied to the surface at the rate of three-eighths (3/8) galion per square yard of street surface. The surface shall then be covered with a light spread of rock chips, ten (10) to twelve (12) pounds to the square yard of surface being used. The cover material shall be broomed to secure even distribution, and then rolled and broomed until thoroughly compacted.

The total time of actual rolling shall be not less than eight (8) hours for each one hundred (100) tons combined weight of coarse rock, screenings and rock chips used in the pavement.

The pavement may be opened to traffic twenty-four (24) hours after completion.

5. Abrasion Test for Rock.—The coefficient of wear for rock shall be obtained as follows:

Rock shall be tested in a Standard Deval rattler according to the following method:

At least thirty (30) pounds of coarse, crushed rock, free from any fragments showing rounded or water worn surfaces shall be available for the test. The rock to be tested shall be broken into pieces as nearly uniform in size as possible and a test sample

shall consist of not less than forty-nine (49) nor more than fifty-one (51) pieces. The total weight of crushed rock to be placed in each cylinder shall be five (5) kilograms (eleven (11) pounds).

All test pieces shall be washed and thoroughly dried before weighing. Ten thousand (10,000) revolutions at the rate of between thirty (30) and thirty-three (33) to the minute shall constitute a test. Only the percentage of material worn off which will pass through a No. 16 sieve shall be considered in determining the amount of wear.

The wear shall be expressed by a coefficient known as the coefficient of wear which shall be obtained by the formula $C = \frac{400}{W}$ where "C" is the coefficient and "W" the weight in grams of the detritus passing the No. 16 sieve per kilogram of rock used.

6. Measurement.—Measurement of Penetration Oil Macadam Pavement shall be by the square feet of surface of actual pavement constructed in place, as shown on the plans or as directed by the District Engineer. No allowance will be made for excess thicknesses or material or work which may have been necessary for any reason whatsoever, to complete the pavement to the grade and section required.

7. Payment.—The price paid per square foot for Penetration Oil Macadam Pavement shall include full compensation for preparing the subgrade, furnishing and setting headerboards and side forms, constructing water-bound base course and Pene-

tration Oil Macadam Top Course, with either hot road oil or Emulsified Road Oil, as specified, together with the furnishing of all labor, materials, tools and equipment and the performance of all work necessary or incidental to constructing the finished pavement, complete in place, as specified.

SECTION 32. TUNNEL CONSTRUCTION

1. General Description.—Highway tunnels shall be constructed at the locations and in accordance with the details as shown on the plans.

The tunnels shall be excavated to the required sections and lined with Portland Cement Concrete throughout their lengths. Accessory structures and facilities, such as ventilation structures and ducts, cross adits, portal structures, lighting and illumination systems, water pipes, hydrants and accessories, ducts, conduits and electrical systems, signals, traffic control systems, sidewalks, railings, pavement, drainage systems and structures, and all incidental structures, facilities and equipment shall be provided and constructed in accordance with the plans and details.

2. Materials.—All materials and workmanship shall conform to the specifications hereinafter set forth in this section, provided that whenever materials, work or methods of construction are not set forth in detail herein, such materials, work or methods of construction shall conform to the requirements elsewhere set forth or provided for or intended by these specifications, and that in all

cases such material, work or methods of construction shall be the best of their kind or quality and in accordance with the highest standard of modern construction practice, and the omission of any specific detail or requirement herein shall not be construed as permitting the use of materials or methods inferior in quality or type to the general intent of these specifications.

3. Safety Rules.—The Contractor shall provide himself with copies of "Tunnel Safety Rules" and "General Construction Safety Orders Relating to the Storage and Use of Explosives," together with all revisions and amendments thereto, as required by the Industrial Accident Commission of the State of California and keep copies of these at the site of the work at all times. He shall consult with officials of the Industrial Accident Commission and inform himself of any and all conditions which they may require, whether set forth in the published rules or specially provided for on this work. He shall thoroughly familiarize himself with the provisions of said rules and all regulations of said Commission and govern all his operations by the requirements in all particulars where the same are applicable. He shall see to it that all superintendents, foremen and other employees having responsibility for the various phases of the tunnel work are likewise familiar with the provisions referred to above, and that all work is conducted in accordance therewith. The requirements concerning ventilation, general safety precautions, transportation,

roof inspection, timbering, electrical installations and use of explosives are of particular importance.

Representatives of the U. S. Bureau of Mines and of the Industrial Accident Commission of the State of California shall be afforded free access to the work at all times and be given every facility for inspecting methods, equipment and familiarity of workmen with the various safety rules and requirements.

All Federal and State regulations for such work or parts thereof and regulations of Counties and Municipalities having local jurisdiction shall be strictly adhered to, and authorized officials representing the Federal or State governments or Counties or Municipalities having jurisdiction shall be given every facility for inspection and proper enforcement of rules, provisions, regulations and ordinances which may apply to the conduct of the work. The Contractor shall be responsible during the entire progress of the work for the proper enforcement of all such requirements and shall assume all liabilities which may occur due to accidents of any kind or nature. The fact that no apparent violation of rules or regulations has occurred shall not serve to relieve the Contractor of his full liability or responsibility in case of accident or damage to persons, employees, or to any part of the work.

Provisions shall be made by the Contractor for a supply of fresh air sufficient for the safety, comfort and efficiency of all persons engaged in the tun-

nel construction, at all times in all portions of the work. Provision shall be made for the quick removal of gases resulting from blasting and frequent tests shall be made for harmful or explosive gases emanating from the rock structure.

Should compliance with safety rules and regulations require special equipment the Contractor shall at all times keep on hand on the work enough of such special equipment to supply, in addition to his own requirements, complete equipment for at least three men, for the use of the District Engineer and his assistants in inspections of the work or in giving lines and grades, or as the District Engineer may direct.

4. Geological Data.—A preliminary report on the geological structures through which the tunnel will pass is on file in the office of the District Engineer. This report is available for inspection by prospective bidders at the office of the District Engineer. The Board of Directors of the District and the District Engineer do not guarantee in any respect the accuracy of this report or the findings or recommendations contained therein. The fact that prospective bidders are permitted to inspect this report shall not in any respect relieve prospective bidders of their responsibility to make their own investigations as to the materials which may be encountered or the geological structures, independent and separate from those made by the District, and the Contractor shall have no claim whatsoever for damages, unexpected costs, difficul-

ties, or for the alteration or voiding of the contract, should materials encountered vary in any respect from those indicated in the preliminary report referred to.

5. Excavation of Tunnels: (a) Excavation.—The Contractor shall use approved modern methods in driving and excavating the tunnels, such as will assure a good rate of progress. He shall furnish and install all timbering, lagging and other supports necessary to provide ample security against falling earth or rock, caving or other movements of the roof, sides or bottom of the excavation. He shall provide for the proper drainage and disposal of water encountered in the excavation.

Before performing any excavation in the tunnel the Contractor shall submit to the District Engineer his proposed method of procedure, giving in detail the various operations leading up to and including the final completed lined section, and no such work shall be performed until the approval by the District Engineer of the procedure has been obtained. Such approval by the District Engineer shall not, however, in any way relieve the Contractor of his responsibility for the failure of the method, or for lack of proper progress in his operations.

The Contractor shall inspect the drift or heading which has been driven by the District at the site of the work, and shall take all necessary steps to prevent caving or failure of timbers in this drift until it is incorporated in the final construction, and shall retimber the same, if, in his judgment,

such work is necessary. He shall assume full responsibility for the maintenance of this drift from the time his contract is approved and in effect, and the provisions of these specifications shall apply in all respects to the proper maintenance and completion of this drift and the construction of the lining and other structures, as though the existing drift had been constructed by the Contractor as a part of his contract. Any alterations or work which may be necessary to make this drift conform to these specifications shall be performed by the Contractor at his own expense and as a part of the work set forth in this contract.

Material excavated from the tunnel section shall be used to make embankments as provided under Section 8, "Grading" of these specifications, and all operations in placing such material in fills or embankments shall conform thereto; provided, however, that any material which in the opinion of the District Engineer is unsuitable for use in embankments shall be disposed of at the expense of the Contractor in a manner satisfactory to the District Engineer; and provided further that material in excess of that required for embankments and for which, in the opinion of the District Engineer, there is no practicable use on any part of the work, shall also be disposed of by the Contractor at his own expense and in a manner satisfactory to the District Engineer.

Material excavated from the tunnel section and required to be used in the making of embankments

will be used only on the highway west of the West Portal, and it is contemplated that all tunnel excavation which is suitable for the purpose will be used to make necessary embankments on this section of the highway. No provision has been made for using any such material on the Northeast highway approach and none shall be placed thereon unless the District Engineer so directs.

Where excavated material is used for embankments on any part of the work the Contractor will be allowed "Overhaul" as provided in Section 8, "Grading" of these specifications, with the following modifications thereof.

No payment for "Overhaul" will be allowed for the distance material is transported within the limits of the tunnels, but haul will be measured from the Station of the Portal of the Tunnels, as shown on the plans, and the provisions for free haul of five hundred feet (500′) shall apply to any distances material is required to be transported beyond such Portal Station. Overhaul will not be paid where unsuitable or surplus material is required to be disposed of by the Contractor at his own expense.

(b) Overbreak.—Excavation shall be of sufficient size to allow for the proper bracing, timbering, construction of lining and forms, and drainage. Extreme care shall be taken in making excavation for the tunnel that the minimum of earth or rock shall be removed or allowed to cave or settle outside of the outer periphery of the concrete structure which forms the tunnel lining. However, should the

Contractor damage or shatter, in any way, materials lying outside of the neat lines of the concrete structure, or should it become necessary in order to properly support the excavated sections that excess volumes be excavated to permit proper timbering or other supports, the Contractor shall remove the rock or materials so damaged or excavated, and the space between the neat lines of the concrete structure, and the lines of actual excavation shall be filled with Portland Cement Concrete mixed in the same proportion and placed at the same time as the concrete in the neat structure, or, when permitted by the District Engineer, dry packed and grouted as hereinafter provided. Where timber is employed for tunnel timbering it shall be removed before any concrete is placed, and any spaces outside the neat lines of the concrete structure caused by such removal shall be filled with concrete as above provided. In the event that it is found impracticable, in the opinion of the District Engineer, to remove timbering or portions thereof, such timbering may be allowed to remain permanently in place, but in no case shall such timber so remaining be allowed to project into the neat lines of the concrete structure. Where timber is permitted to remain, all spaces outside of the neat lines of the concrete structure shall be filled with concrete mixed in the same proportions and placed at the same time as the concrete in the neat structure. If structural steel shapes are used for tunnel sets they may be allowed to remain permanently in place provided

that they do not project into the concrete more than four inches (4″) beyond said neat lines of the concrete structure.

Any excavation which, due to requirements of timbering or the nature of the material, or caused by overbreakage, extends more than one foot (1′) from the outside neat lines of the concrete structure, may, at the option of the Contractor, in lieu of replacing with the Structural Concrete specified, be filled to within one foot (1′) of said neat lines of concrete with spalls, boulders, or other material approved by the District Engineer and grouted in with a cement grout consisting of one (1) part of cement to three (3) parts of fine aggregate, and applied as directed by the District Engineer and to his satisfaction. Such construction, however, shall not be permitted within the one foot (1′) space outside of the neat lines of the concrete structure, and such space shall be filled only with Portland Cement Concrete mixed in the same proportion and placed at the same time as the structural concrete, provided that if steel liner plates and ribs are used and are allowed by the District Engineer to remain in place, the spaces back of plates and ribs shall be dry packed and grouted as provided, but any space between the plates and the neat lines of the structure shall be filled with concrete at the same time as the neat structure.

Wherever reference is made to "neat lines of the concrete structure" it is hereby specified that the neat lines so referred to are the outside lines of the

structural concrete lining, as shown on the plans.

(c) Explosives.—The Contractor shall submit to the District Engineer, and receive his approval of any and all plans for the drilling and shooting of holes, storage and use of explosives, together with time schedules when blasting will be carried on. Extreme care will be required in the use of explosives that the rock or earth lining will not be shattered and that no damage will be done to either temporary or permanent structures which may have been constructed. The District Engineer may, at any time when in his judgment it is necessary, limit the size and strength of explosive charges, or prohibit the use of explosives entirely. The approval by the District Engineer of any method used, quantity or strength of charges, shall not in any way relieve the Contractor of his responsibility for proper execution of the work and the proper use of explosives.

(d) Drainage.—Whenever sand or other granular or loose material is encountered care shall be taken to drain carefully all material to be excavated before such material is removed. Extreme care shall be taken to avoid the removal of any solid material in so draining the excavation. Drains shall be so arranged as to permit inspection of drainage water and avoid the carrying off of any solid material.

Water which may be encountered in the course of the work shall be removed by proper drainage methods, and the Contractor shall provide at his

own expense all pipe, pumps, drains and drainage structures as may be necessary to keep the excavations free from water. He shall dispose of drainage water in such a way as to avoid damage to other parts of the work or to public or private property, and shall save the District harmless from any and all loss or damage therefor at his own cost and expense. All methods adopted by the Contractor shall be subject to the approval of the District Engineer.

(e) Timbering.—The term "Timbering" as used herein shall include all wooden pieces or structures used to support the earth or rock adjacent to any excavation. The Contractor shall furnish, put in place, construct and maintain all timbering necessary to support the sides and top of the excavations, preliminary to the placing of the concrete lining. The timbering shall be so constructed as to prevent any movement or caving which might in any way injure the proposed structures or endanger any person. Wherever, in the opinion of the District Engineer, sufficient or proper timbering has not been provided, the Contractor shall furnish additional timbering; but neither compliance with the District Engineer's instructions nor failure of the District Engineer to give such instructions shall relieve or release the Contractor from his responsibility for the sufficiency of the timbering.

It is the general intent of these specifications that all timbering shall be removed from the excavation before concrete is placed. Should conditions arise

where, in the opinion of the District Engineer, it is impracticable to remove certain timbers or structures, such timbering, upon the written consent of the District Engineer, may be permitted to remain, subject, however, to the provisions herein contained in respect to clearances outside of the concrete lining. Timbers allowed to remain in place shall in no case project into the neat lines of the concrete structure, and, in the event that it is apparent, during the process of excavation and timbering, that the safety of the excavation will require timbering to remain in place, the Contractor shall enlarge the excavated section to the extent necessary to set the timbers outside of future concrete lines; timbers found to project within the concrete lines shall be removed and reset before concreting. Permission to allow timbers to remain will not be granted for any other reason than to secure the safety of the structure.

Where timber is allowed to remain it shall be keyed or wedged firmly against the adjacent rock or earth, and shall be securely fastened, spiked or bolted so that no movement, shifting or settlement shall occur. All joints shall have full and firm bearing, timber to timber, without shimming or blocking. All timber, whether permanent or temporary, shall be sound Douglas fir and no second hand material shall be used, provided, however, that material already used in tunnel construction and removed in good condition, may, with the ap-

proval of the District Engineer, be reused where conditions permit.

Timbering shall be placed in such a manner as to be readily removed, without endangering the safety of the excavation or causing weakness or excessive stresses in adjacent timber sets or concrete structures, and any damage which may occur shall be remedied by the Contractor at his own expense, including the removal and replacement of any concrete which has, in the judgment of the District Engineer, been damaged or subjected to excessive loads on account of such operations.

Lagging behind timber sets shall be restricted to the least extent consistent with safety, and, if, in any case, permitted by the District Engineer to remain permanently in place, shall be so spaced as to permit the unrestricted flow of concrete through the lagging to fill any spaces between the lagging and the excavated surfaces.

(f) Structural Steel Supports.—Structural steel shapes may be used to support the sides and tops of the excavation, either entirely or in connection with timbering. Where structural steel ribs are used the same may be allowed to remain in place, provided that they do not project into the concrete more than four inches (4″) beyond the neat lines of the concrete structure. The manner of framing, supporting and removal shall be such as to fully support the excavation while in place, and permit removal without endangering other parts of the structure. All timbering used in connection therewith shall con-

form to the requirements set forth under "Timbering," including the removal before concrete is placed. Where steel is permitted to remain in place, all spaces between the steel and the adjacent earth or rock shall be thoroughly filled with concrete so as to provide firm and uniform bearing and the steel ribs and liners shall be so constructed and erected that no settlement or movement will occur. Liner plates allowed to remain in place shall not project into the neat concrete structure.

(g) Types of Tunnel Section.—Two typical tunnel sections are shown on the plans. The District Engineer shall determine which section shall be used in any specific location in order to meet varying conditions which may be encountered. In general, it is expected that the Type "A" section will be used throughout the major length of the tunnels, but if conditions arise which, in the judgment of the District Engineer, require the use of Type "B" section, the Contractor shall make such modifications in construction as may be necessary.

No extra payment will be allowed on account of such change, but the unit prices bid for the various units or types of work shall include full compensation for such work, labor, material or equipment as may be necessary.

Concrete Lining

6. Description.—The concrete lining for the tunnels shall consist of the concrete arch ring as shown on the plans, with steel reinforcing as designated or as otherwise directed by the District Engineer.

The thicknesses of concrete shown are minimum thicknesses, and the attention of the Contractor is directed to provisions hereinbefore set forth in this section, requiring additional concrete as made necessary by the methods of excavating, timbering, or otherwise supporting the excavation.

7. Materials.—Concrete for lining shall be Class "B" concrete, as provided in Section 13, "Portland Cement Concrete," of these specifications, and the provisions thereof and the provisions contained in Section 15, "Concrete Structures," shall apply to all concrete in tunnel linings except as modified herein. Grouting shall be performed as elsewhere specified in these specifications.

Reinforcing steel, as shown on the plans, is the minimum requirement and the District Engineer shall have the right and authority to increase the amount of reinforcing steel in accordance with his judgment as to necessity; the Contractor shall furnish and place such additional reinforcing steel at no additional cost to the District, other than the price per pound bid for "Reinforcing Steel in Place." Reinforcing Steel shall conform in all respects to requirements contained in Section 14, "Reinforcing Steel" of these specifications.

All brackets, hangers and other steel work shown shall be placed before pouring of concrete and securely anchored to the satisfaction of the District Engineer, so as not to be disturbed or altered in location by the placing of concrete.

8. Finish.—The surfaces of concrete linings which constitute portions of air ducts shall be constructed with extreme care to obtain the smoothest surface possible. The use of metal forms is elsewhere specified for this work. Repairing of pockets, voids and other irregularities in the surface shall be done with extreme care and all surface irregularities shall be removed so that the finished surface is extremely smooth, and will offer the minimum of frictional resistance to the flow of air.

Ceilings and Partitions

9. Ceilings and Partitions.—The ceilings and partitions, except as otherwise provided, shall be constructed of Class "A" Concrete with structural steel shapes and reinforcing steel as shown on the plans. The Contractor's attention is called to the two inch (2") partition forming the side of the exhaust air duct, where welded wire fabric reinforcing mesh, as shown, is to be covered on each side with a "Gunite" or approved equal covering in a manner to provide a dense, air-tight partition with surfaces of extreme smoothness to avoid frictional resistance to flow of air. The "Gunite" or other approved covering shall consist of a mixture of one (1) part Portland Cement to four and one-half (4½) parts of sand, thoroughly mixed dry and screened to remove any particles over three-eighths inch (⅜") in size. Only sufficient water shall be added to provide a uniform mortar capable of being placed and finished by the methods provided.

Any rebound pockets occurring shall be cut out and replaced with proper material. The surface shall be rodded and steel troweled to a smooth even finish.

Ceiling, partition and wall connections with other walls, partitions or ceilings shall be air-tight, and the approval of the Engineer shall be obtained for all methods of constructing joints. Openings for ducts and ports shall be provided in the forms before the placing of concrete; also for all pipes, conduits and other purposes, including electrical wiring, and for all outlets or other required openings for electrical installations.

The surfaces which constitute the walls and ceiling of the roadway area shall be carefully finished to remove all irregularities in the surface and given a cement wash paint coat, as hereinafter provided for exterior walls in Section 33, "Ventilation Buildings."

10. Fresh Air Flues.—Fresh air flues of the materials and dimensions and location shown on the plans shall be erected on one wall of each tunnel at twelve foot (12′) centers, as shown.

Flues shall be constructed of Structural Grade Steel Plate one-eighth inch (⅛″) thick, and shall be constructed in such a manner as to provide a smooth and air-tight inner surface free from offsets, welds or roughness of any sort. The flues shall be rigidly attached to the arch ring by means of three-eighths inch (⅜″) anchor expansion bolts at twelve inch (12″) centers.

The outlet nozzle shall be fitted with an adjustable zinc plate, of No. 16 (0.045 inch) Sheet Zinc Gauge, welded on hinged edge to steel flue and slotted and held in position by five (5) galvanized three-eighths inch (⅜") set screws and washers for each plate.

A typical flue, complete with adjustable nozzle shall be assembled and submitted to the District Engineer for approval before proceeding with the fabrication of all flues.

The three (3) fresh air flues on each end of each tunnel shall be special flues extended to the fresh air ducts of the transition section.

At each of the three (3) cross adits a fresh air flue three inches (3") deep by eighteen inches (18") wide shall be extended from the main fresh air duct of the up-grade tunnel to the crown of the adit. This flue shall have an inlet opening eighteen inches (18") square and an outlet of three inches (3") by eighteen inches (18") and located as shown on the plans.

11. Exhaust Ports.—Exhaust ports shall be located in pairs in the roadway ceiling at fifteen foot (15') intervals in both tunnels and shall be formed complete at the time the ceiling slab is poured. Special reinforcement at these openings shall be placed as shown on the plans. Water deflectors formed in and as a part of the ceiling slab shall be placed on the up-grade side of each port as shown on the plans. Adjustable zinc slides, of No. 16

(0.045 inch) Sheet Zinc gauge, shall be installed on each port, together with bolts, all as shown on the plans.

12. Sheet Zinc.—Sheet zinc adjustable plates for fresh air flues and exhaust ports shall conform to the Standard Specifications for Rolled Zinc (Type "B") of the American Society for Testing Materials (Serial Designation B 69-29) as amended to date.

13. Air Duct Bulkheads.—Across each air duct in each tunnel at locations designated on the plans, a two inch (2") "Gunite," as hereinabove specified, partition shall be constructed, reinforced with welded wire fabric mesh as shown on the plans. These bulkhead partitions shall have Kalamein doors, with necessary fittings, of size shown on the plans.

14. Air Measurement Stations.—At locations designated on the plans, ferrules shall be placed in the ceiling slab and upper air duct slab. These shall consist of one and one-half inch (1½") inner diameter iron pipe size brass or bronze couplings of lengths as shown and with lugs on exterior surface to prevent turning in concrete and with inside surface threaded at each end and equipped with brass or bronze plugs deeply slotted on face to permit of removal.

15. Roadway Pavement.—The Contractor shall construct the roadway pavement of the thickness and section shown on the plans, and in accordance with specifications contained in Section 16, "Port-

land Cement Concrete Pavement." The subgrade shall be prepared in the manner provided in Section 10 for preparation of subgrade.

16. Curbs and Sidewalks.—The curbs and sidewalks shall be poured integrally with each other and all proper provisions made for pipe lines and conduits as shown on the plans.

Concrete shall be Class "B" concrete, and the top three-quarter inch (¾") of the sidewalk shall consist of a mortar wearing coat of one (1) part Portland Cement and two (2) parts fine aggregate, applied not more than one-half (½) hour after the concrete is placed. The wearing coat shall be troweled smooth and marked as directed by the District Engineer.

17. Drainage Structures and Conduits.—Drainage structures, consisting of pipes, conduits, manholes, lampholes, catchbasins and gratings and cast iron metal work shall be constructed at locations and of dimensions shown on the plans. The materials and workmanship shall conform in all respects to specifications elsewhere contained herein, and anything required for a complete working installation, but not specifically mentioned or specified, shall be furnished and installed by the Contractor and shall be of quality and workmanship equal to the general intent of these specifications and to the satisfaction of the District Engineer.

18. Water Pipes.—Water pipes shall be constructed in the locations shown on the plans and shall conform to requirements set forth in Sec-

tion 24, "Piping," of these specifications. All cocks, plugs, adaptors and other necessary accessories as shown on the plans or as required for proper installation shall be furnished and installed.

19. Measurement.—The lineal feet of tunnel sections between portal buildings, as shown on the plans or as modified by the District Engineer, shall constitute the basis of payment for "Tunnel Construction." The measurement will be the horizontal projection of the center line axis of the finished pavement surface which constitutes the Engineer's survey of the alignment and lengths of tunnels. No other method of measurement will be allowed. Where various types of sections are constructed the actual lengths of such sections as constructed, measured as above stated, shall constitute the lengths of such sections to be paid for. No measurement will be made for concrete placed outside the "neat lines of concrete structure" as defined herein, excess excavation or overbreakage or for transporting material except as provided for under "Overhaul."

Cross adits shall be similarly measured by lineal foot of adit along the center line of the floor between the inner or roadway walls of the tunnels they connect.

20. Payment.—The prices bid per lineal foot for "Tunnel Construction" of the various sections and of "Cross Adits" shall constitute full compensation for all excavation; removing, transporting and de-

positing of materials, as herein provided, timber, ing, drilling, blasting, draining, ventilation, timber and removal, structural steel supports and removal, and all concrete work as shown on the plans, including all concrete placed outside the "neat lines of the concrete structure" and all grouting; for all material furnished and the transporting and placing of all materials; for all form work, including the construction, erection and removal thereof; for all finishing and painting of concrete surfaces; for all ceilings and partitions; for pavement and curbs and sidewalks; for water pipes and accessories; for all drainage structures, pipes, conduits, manholes, lampholes, catch-basins, gratings, cast iron metal work; for furnishing and erecting structural steel shapes and members; for construction complete of flues, ports, bulkheads, air measurement stations; for all conduits, pipes, outlets and fixtures, except as otherwise provided, and for all other necessary construction, as shown on the plans, excepting furnishing and placing of reinforcing steel; and for the performance of all work and the furnishing of all labor, materials, tools and equipment necessary or incidental to the completion of the "Tunnel Construction" and "Cross Adits" as specified herein, or shown on the plans.

"Overhaul," measured outside the Portal limits, shall be paid as provided in Section 8, "Grading," at the unit prices bid, and such payment shall constitute full compensation for the hauling, placing and compacting of excavated material on other

parts of the work. No payment will be made for transporting and disposing of surplus materials not used on other parts of the work.

Reinforcing steel shall be paid for per pound in place, as provided in Section 14, "Reinforcing Steel," of these specifications.

SECTION 33. VENTILATION BUILDINGS

1. Description.—Ventilation buildings shall be constructed at the Easterly and Westerly ends of the Tunnel, as shown on the plans, and shall include both the superstructure and the foundations, together with the transition sections and connecting ducts to the Tunnel proper, and including the roadway pavement, curbs and sidewalk. All necessary excavation shall be included as part of the construction of the buildings.

The ventilation building at the Easterly Portal shall include as an integral part the construction complete of the roadway structure or bridge immediately to the Northeast of the building proper, and which will carry the existing road to a connection with the present Tunnel Road.

The buildings shall be of reinforced concrete and structural steel type of construction, as shown on the plans, and shall conform in all respects to the specifications contained in this section and in other sections which may apply.

This section is intended primarily to cover architectural requirements and the Contractor shall consider this section only as a part of the entire speci-

fication, and not as a separate or complete specification in itself.

Wherever provisions of other parts of these specifications appear to conflict with specifications in this section, provisions of this section shall govern, but in all other respects, when applicable, the provisions of the various sections herein contained shall apply, although not specifically repeated or otherwise referred to in this section.

The work to be done shall include the complete construction of the structures, together with all necessary accessories, including metal work, plumbing, pipes and conduits, roofing, flashing, glazing, hardware, floor coverings, partitions, painting, plastering, doors, elevator—including installation, drains, septic tanks, and whatever else is necessary to properly complete the buildings as shown on the plans or as specified herein. The omission of any detail not specifically shown or mentioned herein shall not relieve the Contractor of his responsibility to provide a complete and finished structure suitable for the purposes intended, with all labor and materials for any detail necessary to carry out the purpose and intent of the plans and specifications; and without extra charge therefor.

Ventilation stacks, fans, damper doors and motors, and electrical equipment, are not a part of the buildings as intended by this section, but the construction of the building shall include the placing and setting of all connection bolts and fittings re-

quired for the complete assembly of the above in the locations required.

2. Conduct of Work.—The Contractor shall so conduct his work that the construction as set forth in this section shall coordinate with other parts of the work, whether done by one Contractor or several Contractors.

The Contractor shall employ at all times on the work provided for in this section a competent general foreman, who shall have had previous experience in general building construction.

The Contractor shall have the full responsibility of constructing the various units of the work as set forth in this section, and his attention is particularly directed to the provisions set forth in Section 6, these specifications, under paragraph "M", "Sub-letting and Assignment."

3. Clearing, Grading and Excavating.—"Clearing," "Grading" and "Structural Excavation" shall be performed in accordance with Sections 7, 8 and 9 of these specifications, and payment for these items will be made in accordance with provisions therein at the unit prices bid.

PLAINTIFF'S EXHIBIT No. 7

JOINT HIGHWAY DISTRICT No. 13
OF THE STATE OF CALIFORNIA

Amendments and Supplements to Final Specifications for Construction of Project, Including Highway, Highway Tunnel and Approaches, With Appurtenant Structures

WALLACE B. BOGGS
District Engineer

DIRECTORS

Thomas E. Caldecott.....President
Harry M. Stow.....Secretary
Henry L. Hinman.....Treasurer

LEGAL

Archibald B. Tinning.....Attorney

Specification No._____
Set No._____

Joint Highway District No. 13
of the State of California
office of
Wallace B. Boggs,
District Engineer
1448 Webster Street
Oakland, California

January 9, 1934

AMENDMENTS AND SUPPLEMENTS TO FINAL SPECIFICATIONS FOR CONSTRUCTION OF PROJECT.

Paragraph 17 of Section 34 of the final specifications heretofore adopted by the Board of Directors of Joint Highway District No. 13 of the State of California on the 30th day of March, 1933, and approved by Earl Lee Kelly, Director of the Department of Public Works of the State of California on the 5th day of April, 1933, is hereby amended to read as follows:

"After the final award of contract and not less than four (4) months prior to the installation of the ventilating equipment provided for in these specifications in the buildings on the project, tests on one (1) blower fan and one (1) exhaust fan will be required to verify the performance curves submitted with the bid. These tests will be made at the manufacturer's plant or other place suitable to

all concerned. These tests shall be made in the presence of a reputable testing engineer or firm of testing engineers to be designated by the District Engineer, and shall be in strict accordance with the Standard Test Code of the National Association of Fan Manufacturers and of the American Society of Heating and Ventilating Engineers, adopted June 1923, or as subsequently amended."

The final specifications adopted March 30, 1933, by the Board of Directors of the District and approved on the 5th day of April, 1933, by Earl Lee Kelly, Director of the Department of Public Works of the State of California, are hereby amended to read as follows:

"In all cases where the said final specifications provide that the Contractor shall submit to the District Engineer complete shop drawings in triplicate of all the equipment proposed to be furnished, which drawings shall show the weight of all parts and of the assembled units; material from which each part is constructed, complete dimensions and clearances required for removal of parts of units; location and sizes of anchor and connection bolts, and all such information as is hereinafter called for in these specifications and as may be required by the District Engineer. Such shop drawings showing all of the matters and things hereinabove specified shall be submitted to the District Engineer in not less than four (4) months prior to the installation of any mechanical equipment on the project."

Attention of all bidders under these specifications is called to the fact that since the adoption of the final plans and specifications for the project of Joint Highway District No. 13 on the 30th day of March, 1933, and the approval thereof by Earl Lee Kelly, Director of the Department of Public Works of the State of California on the 5th day of April, 1933, the President of the United States has approved the National Industrial Recovery Act and in accordance with law has created a Public Works Administration and a special Board for public works, and that said National Industrial Recovery Act and the Rules and regulations approved by said special Board for public works require consideration by bidders in submitting proposals under said plans and specifications.

The attention of all bidders is hereby specifically called to Bulletin No. 2 of Federal Emergency Administration of Public Works entitled "General Information and Instructions for the Guidance of State Advisory Boards and State Engineers (P.W.A.)." A grant of thirty (30) per cent of the cost of labor and material used in the project of the District has been made by the Public Works Administration of the United States under the terms of said National Industrial Recovery Act, and all bidders are hereby advised that the Directors of the District will cooperate with the Public Works Administration and all its officers and employees in the enforcement of all of the provisions of said

National Industrial Recovery Act and the rules and regulations heretofore and hereafter promulgated applicable to the performance of the work on the project of the District.

Bidders are advised to secure complete information as to the rules and regulations of the Public Works Administration applicable to the work to be performed to complete the project of the District, to the latest date available at the time the respective proposals of the bidders are submitted to the District.

All bidders are hereby advised that the District has applied to the Public Works Administration for a waiver of the provisions of subdivision (c) of Article A of subdivision B of said Bulletin No. 2 of the Public Works Administration which reads as follows:

"(c) No work shall be permitted on Sundays or legal holidays, except in cases of emergency," for the reason that the tunnel work on the project of the District may be more safely and efficiently performed if continuous construction is permitted. Whether or not the application of the District for a waiver of said provision of said subdivision (c) will be granted, cannot be ascertained until proper authorities of the Public Works Administration have acted upon the request of the District for said waiver, and all bidders are hereby notified to inquire at the office of the District Engineer, 1448 Webster Street, Oakland, California, at least ten

(10) days prior to the final date for the submission of bids to ascertain whether or not the application of the District for a waiver of the provisions of said subdivision (c) has been acted upon, and as to whether or not work may proceed on the project of the District on Sundays and holidays.

Wherever reference is made in the said final specifications adopted March 30, 1933, and approved by Earl Lee Kelly, Director of the Department of Public Works of the State of California on the 5th day of April, 1933, to any law of the State of California or to the regulation of any commission or regulatory body of the State of California, said final specifications are hereby amended to include a reference to all laws of the State of California enacted since the adoption of said final specifications which amend, supplement, complement or repeal any of the laws refered to in said final specifications. Likewise all regulations of any commission or official board or official body of the State of California, which have been promulgated or issued since the date of the adoption of said final specifications which supplement, amend, complement or add to the regulations of such commission, board or official body, in effect at the date of the adoption of said final specifications, are hereby referred to and incorporated in said final specifications for all purposes the same as if set forth herein at length, it being the intention of the District by this paragraph of the final specifications to

call the attention of all bidders to the fact that all laws of the State of California and all regulations of all commissions, boards and public bodies of the State of California enacted or promulgated since the adoption of said final specifications as aforesaid shall apply to the work to be performed under the contract awarded to the successful bidder as fully as if in these specifications set forth at length.

Paragraph (z-2) of Section 6 of the original specifications adopted March 30, 1933, and approved by Earl Lee Kelly, Director of the Department of Public Works of the State of California on the 5th day of April, 1933, is hereby amended to read as follows:

"(z-2) Payment of Not Less Than General Prevailing Rate of Wages . The Contractor and all subcontractors under him shall pay all their laborers, workmen, mechanics and employees on said work a salary or wage at least equal to the prevailing salary or wage for the same quality of service rendered to private persons, firms or corporations under similar employment and which salary or wage shall not be less than general prevailing rate of per diem wages for the work of a similar character in the locality in which the work is performed, and not less than the general prevailing rate of per diem wages for overtime work, and which salary or wage shall not be less than the stipulated rates contained in a schedule thereof which has been ascertained and determined by the Board of Directors of the Dis-

trict and which is now on file with the Secretary of said Board and by reference incorporated herein and made a part hereof, and a copy of which is hereunto appended and marked "Exhibit A." Reference to said schedule of salary or wages, a copy of which is hereto appended and marked "Exhibit A" was ascertained and determined and adopted by a resolution of the Board of Directors of the District on the 9th day of January, 1934. The Contractor shall forfeit as a penalty to the District Ten ($10.00) Dollars for each laborer, workman or mechanic employed for each calendar day or portion thereof, if such laborer, workman or mechanic is paid less than said stipulated wages for work done under said contract by him, or by any subcontractor under him, in violation of Chapter 397 of the Laws of 1931 (Stats. 1931, page 910) of the State of California, and said sums and amounts which shall have been so forfeited shall be withheld and retained from payments due to the Contractor pursuant to this contract and the terms of said Act; provided, however, that no sum shall be so withheld, retained or forfeited except from the final payment, without a full investigation by either the Division of Labor Statistics and Law Enforcement of the State Department of Industrial Relations or by said Board of Directors.

AMENDMENTS AND SUPPLEMENTS TO FINAL SPECIFICATIONS TO CONFORM TO REQUIREMENTS OF FEDERAL EMERGENCY ADMINISTRATION OF PUBLIC WORKS

Article A. (a) Convict Labor. No convict labor shall be employed on the project and no materials manufactured or produced by convict labor shall be used on the project.

(b) Thirty-Hour Week. Except in executive, administrative and supervisory positions, so far as practicable and feasible in the judgment of the Government Engineer, no individual directly employed on the project shall be permitted to work more than 30 hours in any 1 week: Provided, That this clause shall be construed to permit working time lost because of inclement weather or unavoidable delays in any 1 week to be made up in the succeeding 20 days.

This provision shall for the purposes of this contract supersede the terms of any code adopted under title I of the National Industrial Recovery Act.

(c) No work shall be permitted on Sundays or legal holidays except in cases of emergency. (Note: See page 4 of these Amendments.)

Article B. (a) Wages. All employees directly employed on this work shall be paid just and reasonable wages, which shall be compensation sufficient to provide, for the hours of labor as limited, a standard of living in decency and comfort. The

Contractor and all subcontractors shall pay not less than the minimum hourly wage rates for skilled and unskilled labor prescribed by the Federal Emergency Administration of Public Works, viz:

Skilled Labor	$1.10
Unskilled Labor	$ .45

(b) A clearly legible statement of all wage rates to be paid the several classes of labor employed on the work shall be posted in a prominent and easily accessible place at the site of the work, and the Contractor shall keep a true and accurate record of the hours worked by and the wages paid to each employee and shall furnish the Government Engineer with a sworn statement thereof on demand. All employees shall be paid in full not less often than once each week and in lawful money of the United States in the full amount accrued to each individual at the time of closing of the pay roll, which shall be at the latest date practicable prior to the date of payment, and there shall be no deductions or rebates on account of goods purchased, rent, or other obligations, but such obligations shall be subject to collection only by legal process.

(c) In the event that the prevailing hourly rates prescribed under collective agreements or understandings between organized labor and employers on April 30, 1933, shall be above the minimum rates specified above, such agreed wage rates shall apply: PROVIDED, That such agreed wage rates shall be effective for the period of this contract, but

not to exceed 12 months from the date of the contract.

(d) The above designated minimum rates are not to be used in discriminating against assistants, helpers, apprentices, and serving laborers who work and serve skilled journeymen mechanics and who are not to be termed as "Unskilled Laborers."

(e) The minimum wage rates herein established shall be subject to change by the Federal Emergency Administration of Public Works on recommendation of the Board of Labor Review. In event that the Federal Emergency Administration of Public Works acting on such recommendation establishes different minimum wage rates, the contract price shall be adjusted accordingly on the basis of all actual labor costs on the project to the Contractor, whether under this contract or any subcontract.

(f) The Board of Labor Review shall hear all labor issues arising under the operation of this contract and as may result from fundamental changes in economic conditions during the life of this contract. Decisions of the Board of Labor Review, including decisions as to its jurisdiction to act upon the application of persons not parties to this contract, shall be binding upon all parties.

Article C. (a) Labor Preferences. Preference shall be given, where they are qualified, to ex-service men with dependents, and then in the following order: (1) To citizens of the United States and aliens who have declared their intention of becom-

ing citizens, who are bona fide residents of the political subdivision and/or county in which the work is to be performed and (2) to citizens of the United States and aliens who have declared their intention of becoming citizens, who are bona fide residents of the State, Territory, or district in which the work is to be performed: Provided, that these preferences shall apply only where such labor is available and qualified to perform the work to which the employment relates.

(b) Employment Services. To the fullest extent possible, labor required for the project and appropriate to be secured through employment services, shall be chosen from the lists of qualified workers submitted by local employment agencies designated by the United States Employment Service: Provided, however, That organized labor, skilled and unskilled, shall not be required to register at such local employment agencies but shall be secured in the customary ways through recognized union locals. In the event, however, that qualified workers are not furnished by the union locals within 48 hours (Sundays and holidays excluded) after request is filed by the employer, such labor may be chosen from lists of qualified workers submitted by local agencies designated by the United States Employment Service. In the selection of workers from lists prepared by such employment agencies and local unions, the labor preferences provided in section (a) of this article shall be observed.

(c) Compliance with Title I, N.I.R.A. The Contractor agrees to comply with the conditions prescribed in section 7 (a) (1) and 7 (a) (2) of title I of the National Industrial Recovery Act, and to cause all subcontractors to comply therewith.

Article D. Human Labor. The maximum of human labor shall be used in lieu of machinery wherever practicable and consistent with sound economic and public advantage; and to the extent that the work may be accomplished at no greater expense by human labor than by the use of machinery, and labor of requisite qualifications is available, such human labor shall be employed.

Article E. Compensation Insurance. The Contractor will furnish compensation insurance for employees on this work and comply with the workmen's compensation laws of the State, Territory, or district in which the work is to be performed, and will give proof of such adequate insurance satisfactory to the Government Engineer.

Article F. Persons Entitled to Benefits of Labor Provisions. The Contractor will extend to every person who performs the work of a laborer or of a mechanic on the project or on any part thereof the benefits of the labor and wage provisions of this contract, regardless of any contractual relationship between the Contractor and such laborer or mechanic, or between any subcontractor and such laborer or mechanic. There shall be no discrimination in the selection of labor on the ground of race, creed or color.

Article G. Withholding Payment. Joint Highway District No. 13 of the State of California may withhold from the Contractor so much of accrued payments as may be necessary to pay to laborers or mechanics employed by the Contractor or any subcontractor on the work, the difference between the rate of wages required by this contract to be paid to laborers or mechanics on the work and the rate of wages actually paid to such laborers or mechanics.

Article H. Inspection of Record. The Federal Emergency Administration of Public Works, through its authorized agents, shall have the right to inspect all work as it progresses, and shall have access to all pay rolls, records of personnel, invoices of materials, and any and all other data relevant to the performance of this contract.

Article I. (a) N.R.A. Materials. So far as articles, materials, and supplies produced in the United States are concerned, only articles, materials, and supplies produced under codes of fair competition under title I of the National Industrial Recovery Act, or under the President's Reemployment Agreement, shall be used in the performance of this work, except when the Government Engineer certifies that this requirement is not in the public interest or that the consequent cost is unreasonable.

(b) Local Preference. So far as practicable, and subject to the provisions of section (a) of this article, preference shall also be given to the use of

locally produced materials if such does not involve higher cost, inferior quality, or insufficient quantities, subject to the determination of the Government Engineer.

Article J. Reports. The Contractor will make report in triplicate monthly and cause all subcontractors to report in like manner, within 5 days after the close of each calendar month, on forms to be furnished by the United States Department of Labor, the number of persons on their respective pay rolls, the aggregate amount of such pay rolls, and the man-hours work, wage scales paid to the various classes of labor, and the total expenditures for materials. Two copies of each monthly reports are to be furnished to the Government Engineer, and one copy to the United States Department of Labor. The Contractor shall also furnish to the Joint Highway District No. 13 of the State of California, to the Government Engineer, and to the United States Department of Labor the names and addresses of all subcontractors on the work at the earliest date practicable.

Article K. Accident Prevention. The Contractor shall at all times exercise reasonable precautions for the safety of employees on the work and shall comply with all applicable provisions of the Federal, State, and municipal safety laws and building and construction codes. All machinery and equipment and other physical hazards shall be guarded in accordance with safety codes approved by the

American Standards Association, unless such codes are incompatible with Federal, State, or municipal laws or regulations.

Article L. (a) Subcontractors. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relating to this work to insure the fulfillment of all provisions of this contract affecting such subcontractors, particularly articles A-K, inclusive.

(b) All bids submitted by subcontractors should state the minimum wage rates established in article B hereof.

(c) No subcontract shall be let to any subcontractor who has not signed and complied with the applicable code or codes of fair competition approved under title I of the National Industrial Recovery Act for the trade or industry or subdivision thereof to which the work relates, or, if there be no approved code of fair competition for such trade or industry or subdivision, who has not signed and complied with the President's Reemployment Agreement.

Article M. Termination for Breach. In the event that any of the provisions of articles A to L of this contract are violated by the Contractor or by any subcontractor on the work, the Joint Highway District No. 13 of the State of California may terminate the contract by written notice to the Contractor. In such event Joint Highway District No. 13 of the State of California may take over the work

and prosecute the same to completion by contract or otherwise, and the Contractor and his sureties shall be liable to the Joint Highway District No. 13 of the State of California for any excess cost occasioned the Joint Highway District No. 13 of the State of California, and Joint Highway District No. 13 of the State of California may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the site of the work and necessary therefor.

Article N. Definition. The term "Government Engineer" as used herein shall mean the State Engineer (P.W.A.) or his duly authorized representative, or any person to whom his duties or functions may be transferred by the Federal Emergency Administration of Public Works, or its successors.

[Endorsed]: U. S. Dist Ct. N. D. Cal. No. 20101-R. Plff's Ex. No. 7. Filed April 13, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

PLAINTIFF'S EXHIBIT No. 16

CONTRACT

Between Joint Highway District No. 13 of the State of California and Six Companies of California, a corporation.

Dated: June 4th, 1934. Filed June 14th, 1934. Harry M. Stow, Secretary, by L. V. Eaton, Ass't Secty.

Note: This form for information only. The actual contract will be prepared on a similar form by the Attorney for the District upon award of contract.

CONTRACT

THIS AGREEMENT, made and entered into this 4th day of June, 1934, by and between Joint Highway District No. 13 of the State of California, hereinafter designated as the first party, and Six Companies of California, a Nevada corporation duly qualified to, and doing business in the State of California, hereinafter designated as the second party;

WITNESSETH:

That whereas it has been determined by the Board of Directors to construct, erect and complete the project of said Joint Highway District No. 13 of the State of California, which includes a highway, highway tunnel and approaches with appurtenant structures, including ventilation buildings, ventilation equipment and accessories, and the con-

struction of highway approaches with pavement, drainage structures, curbs, gutters and sidewalks where required, construction of grade separation structures, viaducts, retaining walls and incidental structures, and connections with existing streets; located partly in the City of Oakland, County of Alameda, State of California, and partly in the County of Contra Costa, State of California, and all in said Joint Highway District No. 13 of the State of California, the westerly terminus of said project being located near Broadway and Keith Avenue in the said City of Oakland and the easterly terminus of said project being a point on the State Highway in said Contra Costa County approximately fourteen hundred (1,400') feet northerly from the intersection of the Fish Ranch Road with said State Highway which is commonly known as and called the "Tunnel Road," all in accordance with the final surveys, plans, specifications and detailed drawings therefor adopted by the Board of Directors of said Joint Highway District No. 13 on the 30th day of March, 1933, and the amendments and supplements to said final specifications adopted by the Board of Directors of said Joint Highway District on the 9th day of January, 1934, and on the 3rd day of April, 1934, made by Wallace B. Boggs, District Engineer, now on file in the office of the first party, and which said final surveys, plans, specifications and detailed drawings are hereby referred to for a more definite, complete and distinct description of the work to be performed

under this contract, and which are hereby made a part of this contract the same as though fully set forth herein;

Now, therefore, in consideration of the premises and in further consideration of the sums to be paid by the first party to the second party herein, as hereinafter provided, in full for the performance of all acts and things to be done and performed by said second party, the said second party, for itself, its successors or assigns, hereby promises, covenants and agrees with the said first party that the said second party will honestly and faithfully do and perform the work herein referred to and will furnish all the labor and material necessary therefor in strict accordance with the said plans and specifications and in strict accordance with the terms of this contract and agreement, and upon the completion of said work as provided for by the terms of this contract that the said second party will deliver said work and structures herein provided for to the first party or its authorized agents.

That in consideration of the foregoing covenants, promises and agreements on the part of the second party and the faithful performance of said work and the strict and literal fulfillment of each and every such covenant, promise and agreement, and as compensation agreed upon for said work of construction, erection and completion as aforesaid, the first party covenants, promises and agrees to pay the sums hereinafter set forth to the second party in full for said work, as follows, to-wit:

Items	Quantity Estimates	Unit Prices		Estimated Total
1. Grading	763,000 cu. yds.	at $ 0.33	per cu. yd.	$ 251,790.00
2. Overhaul	8,100,000 sta. yds.	at $ 0.005	per sta. yd.	$ 40,500.00
3. Structural Excavation, Class "A"	44,000 cu. yds.	at $ 1.20	per cu. yd.	$ 52,800.00
4. Structural Excavation, Class "B"	1,000 cu. yds.	at $ 2.00	per cu. yd.	$ 2,000.00
5. Shoulders	362,000 sq. ft.	at $ 0.035	per sq. ft.	$ 12,670.00
6. Reinforcing Steel	4,420,000 lbs.	at $ 0.04	per lb.	$ 176,800.00
7. Structural Steel	445,000 lbs.	at $ 0.05	per lb.	$ 22,250.00
8. Concrete Structures, Class "A" Concrete	12,150 cu. yds.	at $15.50	per cu. yd.	$ 188,325.00
9. Concrete Structures, Class "B" Concrete	3,200 cu. yds.	at $14.50	per cu. yd.	$ 46,400.00
10. Portland Cement Concrete Pavement, 8 inch	37,700 sq. ft.	at $ 0.24	per sq. ft.	$ 9,048.00
11. Portland Cement Concrete Pavement, 6 inch	30,400 sq. ft.	at $ 0.18	per sq. ft.	$ 5,472.00
12. Asphalt Concrete	44,000 sq. ft.	at $ 0.08	per sq. ft.	$ 3,520.00
13. Penetration Oil Macadam Pavement	724,000 sq. ft.	at $ 0.14	per sq. ft.	$ 101,360.00
14. Concrete Curbs, 6 inch	2,725 lin. ft.	at $ 0.52	per lin. ft.	$ 1,417.00
15. Concrete Curbs, 12 inch	945 lin.ft.	at $ 0.80	per lin. ft.	$ 756.00
16. Concrete Curb, 6 inch, with guard	46 lin. ft.	at $ 1.00	per lin.ft.	$ 46.00
17. Concrete Gutters	4,300 sq. ft.	at $ 0.25	per sq. ft.	$ 1,075.00
18. Cement Sidewalks	21,000 sq. ft.	at $ 0.13	per sq. ft.	$ 2,730.00
19. Fill Protectors	15	at $19.00	each	$ 285.00
20. Corrugated Metal Pipe Culvert, 8 inch	1,470 lin. ft.	at $ 1.30	per lin. ft.	$ 1,911.00
21. Corrugated Metal Pipe Culvert, 12 inch	210 lin. ft.	at $ 2.00	per lin. ft.	$ 420.00

Items	Quantity Estimates	Unit Prices		Estimated Total
22. Corrugated Metal Pipe Culvert, 18 inch	3,300 lin. ft.	at $ 3.00	per lin. ft.	$ 9,900.00
23. Reinforced Concrete Pipe Culvert, 10 inch, "S"	340 lin. ft.	at $ 1.20	per lin. ft.	$ 408.00
24. Reinforced Concrete Pipe Culvert, 12 inch, "S"	750 lin. ft.	at $ 1.50	per lin. ft.	$ 1,125.00
25. Reinforced Concrete Pipe Culvert, 15 inch "S"	430 lin. ft.	at $ 1.80	per lin. ft.	$ 774.00
26. Reinforced Concrete Pipe Culvert, 18 inch "S"	85 lin. ft.	at $ 2.00	per lin. ft.	$ 170.00
27. Reinforced Concrete Pipe Culvert, 24 inch "X"	1,470 lin. ft.	at $ 4.40	per lin. ft.	$ 6,468.00
28. Reinforced Concrete Pipe Culvert, 36 inch "X"	680 lin. ft.	at $ 8.50	per lin. ft.	$ 5,780.00
29. Vitrified Pipe Sewers, 6 inch	190 lin. ft.	at $ 1.00	per lin. ft.	$ 190.00
30. Vitrified Pipe Sewers, 8 inch	415 lin. ft.	at $ 1.20	per lin. ft.	$ 498.00
31. Manholes, Standard tops	10	at $90.00	each	$ 900.00
32. Manholes, Inlet tops	5	at $100.00	each	$ 500.00
33. Manholes, Grating tops	4	at $90.00	each	$ 360.00
34. Storm Water Inlets, 34-inch openings	1	at $75.00	each	$ 75.00
35. Storm Water Inlets, "B"	10	at $100.00	each	$ 1,000.00
36. Storm Water Inlets, "C"	12	at $80.00	each	$ 960.00
37. Lampholes, 6 inch	1	at $24.00	each	$ 24.00
38. Lampholes, 8 inch	1	at $26.00	each	$ 26.00
39. Lampholes, 12 inch	3	at $36.00	each	$ 108.00
40. Handhole	1	at $30.00	each	$ 30.00
41. Underdrains, 8 inch Perforated Corrugated Metal Pipe	4,100 lin. ft.	at $ 1.40	per lin. ft.	$ 5,740.00

Items	Quantity Estimated	Unit Prices		Estimated Total
42. Piping, Cast Iron, 6 inch	2,020 lin. ft.	at $ 1.50	per lin. ft.	$ 3,030.00
43. Guard Rail	12,400 lin. ft.	at $ 0.80	per lin. ft.	$ 9,920.00
44. Pipe Hand Rail	640 lin. ft.–	at $ 3.00	per lin. ft.	$ 1,920.00
45. Riprap	220 cu. yds.	at $ 5.00	per cu. yd.	$ 1,100.00
46. Metal Cribbing	46,000 lbs.	at $ 0.13	per. lb.	$ 5,980.00
47. Stone or Gravel for Foundations	330 cu. yds.	at $ 3.00	per cu. yd.	$ 990.00
48. Tunnel Construction Type "A"	5,620 lin. ft.	at $325.00	per lin. ft.	$1,826,500.00
49. Tunnel Construction Type "B"	200 lin. ft.	at $400.00	per lin. ft.	$ 80,000.00
50. Cross Adits	322 lin. ft.	at $40.00	per lin. ft	$ 12,880.00
51. Ventilation Buildings, West Building and East Building, Complete	Lump sum			$ 340,000.00
52. Ventilation Equipment, Furnishing and Installing, Complete	Lump sum			$ 160,000.00
53. Mechanical Equipment, Furnishing and Installing, Complete	Lump Sum			$ 60,000.00
54. Electrical Equipment, Furnishing and Installing, Complete	Lump sum			$ 210,000.00
55. Carbon Monoxide Detectors and Recorders, Furnishing and Installing, Complete	Lump sum			$ 15,000.00
			Total	$3,683,931.00

The unit prices hereinabove set forth are the prices bid by the second party and accepted by the first party and payment shall be made to second party on the basis of the units furnished of each item hereinabove specified. The lump prices for items 51 to 55 inclusive, hereinabove set forth, are in each case the total prices to be paid by the first party to the second party for the items therein listed.

A copy of the bid of the second party is on file with the Secretary of the Board of Directors of the first party and is hereby expressly referred to and made a part of this agreement.

It is hereby mutually understood and agreed by and between the parties hereto as follows:

1. That the work provided for by this contract shall be actually commenced by said second party within (10) calendar days from and after the execution of the same and shall be completed within seven hundred twenty (720) calendar days from and after the execution of this contract, time being of the essence hereof.

2. That the price to be paid said second party as hereinbefore provided shall be paid in legally executed and regularly issued warrants of the said first party, drawn on the appropriate fund or funds of said Joint Highway District, as required by law and the order of the Board of Directors of the first party.

3. That the said first party, or its regularly appointed District Engineer and his assistants and

agents shall, at all times during the progress of said work, have free access thereto, and shall be allowed to examine the same, and all the material to be used therein, and if the same or any part thereof shall not be in strict accordance with said plans and specifications herein referred to, it shall refuse to accept and shall reject said defective work and material.

The whole of said work is to be done to the satisfaction and approval of said first party and its agents authorized to superintend the same, in strict accordance with the plans and specifications hereinbefore referred to.

4. That the second party is skilled in the trade or calling necessary to perform the work agreed to and done under this contract, and that the first party, not being skilled in such matters, relies upon the skill of said second party to do and perform the work and labor necessary in the most skillful and durable manner, and said second party guarantees the same, and the acceptance of the work does not operate as a release to said second party or its bondsmen from said guarantee.

5. That the second party further agrees that if the work to be done under this contract and agreement shall be abandoned, or if this contract shall be assigned by the second party, or if at any time the District Engineer shall be of the opinion, and shall so certify in writing to the said first party

that the said work or any part thereof is unnecessarily or unreasonably delayed, or that the said second party is wilfully violating any of the conditions or covenants of this contract, or is executing this contract in bad faith, the said first party shall have the power to notify the said second party to discontinue all work or any part thereof under this contract, and thereupon the said second party shall cease to continue said work or such part thereof as said first party may designate, and the said first party shall thereupon have the power to place such and so many persons, and to obtain by contract, purchase or hire, such animals, carts, wagons, implements, tools, material or materials, by contract or otherwise, as said first party may deem advisable, to work at and be used to complete the work herein described, or such part thereof as the agent authorized to superintend the same may deem necessary, and to use such material as they may find upon the line of said work and to charge the expense of such labor and material, animals, carts, wagons, implements and tools to the second party, and the expense so charged shall be deducted and paid by the first party out of such moneys as may be either due or may at any time thereafter become due to the said second party under and by virtue of this contract or any part thereof.

In case such expense is less than the sum which would have been payable under this contract, if the same had been completed by the said second party,

the said second party shall be entitled to receive the difference, and in case such expense shall exceed the last said amount, then the said second party or its bondsmen shall pay the amount of such excess to the first party on notice from the said first party of the excess so due.

6. That upon notice of the completion of said work, the said first party or its agent shall proceed without delay to examine the same, and if found to be in accordance with the aforesaid plans and specifications and this agreement, shall accept said work and shall notify the second party thereto, or its agents, of such acceptance.

7. Payments for said work will be made only upon the certificate of the District Engineer for work actually performed. The District Engineer shall measure the work on or about the first day of each month and at the time of completion of the entire work, and shall render a certificate on or about the tenth day of each month and at the completion of the entire work, stating the amount of work performed during the previous calendar month, and during the current month, at the time of completion. The Contractor shall then, at the times above specified, be entitled to receive a payment from the District in an amount to be determined as follows: Until the total value of the work done since commencement of performance of the contract exceeds Four Hundred Thousand Dollars ($400,000.00) the payment will be seventy-five per

cent (75%) of the amount specified in the District Engineer's certificate; thereafter and until the total value of the work done since the commencement of performance of the contract equals One Million Dollars ($1,000,000.00), the constant sum of One Hundred Thousand Dollars ($100,000.00) will be retained by the District out of said total value; thereafter the progress payment will be ninety per cent (90%) of the amount specified in the Engineer's certificate, provided that no such estimate of payment shall be required to be made when, in the judgment of the District Engineer, the work is not proceeding in accordance with the provisions of the contract, or when, in his judgment, the total value of the work done since the last estimate amounts to less than Five Hundred Dollars ($500.00), except the certificate and payment required at the completion of the entire work.

The acceptance by the Contractor of the final ninety per cent (90%) payment for the completed work shall be and shall operate as a release to the District from all claims and liability to the Contractor for anything done or furnished for or relating to the work, or for any act or neglect of the District or its agent in any way affecting the work, excepting the claim of the Contractor against the District for the moneys herein provided to be paid by the District to the Contractor thirty-five (35) days after the acceptance of the contract.

Thirty-five (35) days after the acceptance of the work by a certificate of acceptance duly rendered by

the District Engineer and final approval and acceptance by the Board of Directors of the District, the Contractor shall be entitled to receive a payment of the balance due under this contract in the amount of ten per cent (10%) of the aggregate amount of all certificates of the District Engineer.

8. That the said second party shall furnish and deliver to the said first party, upon the execution of this contract, a good and sufficient bond and undertaking in the sum of One Million Eight Hundred Forty-two Thousand ($1,842,000.00) Dollars, with sufficient corporate surety thereon, approved by the Board of Directors of first party, conditioned for the faithful performance of this contract by second party, according to the terms and provisions herein.

9. That the said second party shall furnish and deliver to said first party, upon the execution of this contract, a good and sufficient bond and undertaking in the sum of at least One Million Eight Hundred Forty-two Thousand ($1,842,000.00) Dollars, approved by the Board of Directors of first party, with sufficient corporate surety thereon in accordance with any law of the State of California requiring the same and with an Act of the Legislature of the State of California, entitled, "An Act to secure the payment of the clams of persons employed by contractors upon public works, and the claims of persons who furnish materials, supplies, teams, implements or machinery used or consumed by such contractors in the performance of

such works, and prescribing the duties of certain public officers with respect thereto," and any Act or Acts amendatory thereof.

10. That eight hours' labor shall constitute a day's work for any one calendar day, and all work and labor performed under and in accordance with the terms and conditions of this contract.

11. That no laborer, workman or mechanic employed at any time by the said second party, or by any subcontractor or subcontractors under it, upon the work or upon any part of the work contemplated by this contract, shall be required or permitted to work thereupon more than eight hours in any one calendar day, except in cases of extraordinary emergency caused by fire, flood or danger to life or property, or except to work upon public, military or naval defenses or works in time of war; provided, however, that within thirty (30) days after any employee is permitted to work over eight hours in any one calendar day due to such extraordinary emergency, the contractor or its duly authorized agent shall file with the Board of Directors of the first party a report verified by oath setting forth the nature of the said emergency, which report shall contain the name of said worker and the hours worked by him on said day, and failure to file the said report within the said time shall be prima facie evidence that no extraordinary emergency existed. The contractor and each subcontractor shall also keep an accurate record showing the names and actual hours worked of all workers em-

ployed in connection with the said public work, which record shall be open at all reasonable hours to the inspection of the Board of Directors of the first party or its deputies or agents, and to the Chief of the Division of Labor Statistics and Law Enforcement of the Department of Industrial Relations, his deputies or agents. The said second party hereby agrees to forfeit as a penalty to the said first party, out of any moneys becoming due to it from the said first party, under the terms of this contract, the sum of Ten ($10.00) Dollars for each laborer, workman, or mechanic employed in the execution of this contract by said second party, or by any subcontractor under said second party, for each and every calendar day during which said laborer, workman or mechanic is required or permitted to labor more than eight hours in violation of the provisions of Section 653c of the Penal Code of the State of California, and that the said first party is hereby authorized and directed through its proper representatives, to withhold and retain from the said second party, or from the said subcontractors under it, all sums and amounts which shall have been forfeited pursuant to this stipulation, as the property of the said first party, as provided for by Section 653c of the Penal Code of the State of California, and any Act or Acts amendatory thereof; provided, however, that no sum shall be so withheld, retained or forfeited, except from the final payment, without a full investigation by either the Division of Labor Statistics and Law En-

forcement of the State Department of Industrial Relations or by said Board of Directors.

12. That the said second party shall, at its own expense, before commencing work under this contract, take out and at all times during the prosecution of the work hereunder, and until final completion and acceptance thereof, maintain, in full force and effect, compensation insurance with an insurance carrier satisfactory to said first party, covering the full liability of said second party to any and all persons employed by said second party, directly or indirectly, in or upon said work, or their dependents, in accordance with the provisions of the Workmen's Compensation Insurance and Safety Act, Chapter 176 of the Laws of 1913 of the State of California, and any Act or Acts amendatory thereof.

And said second party failing to take out or maintain such compensation insurance before commencing work under this agreement, the same may be taken out, maintained or renewed by said first party at the cost and expense and in the name of said second party, said cost and expenses thereof to be deducted from any installment payment becoming due to said second party hereunder.

13. That if any material, composition, process, or any other thing so called for or required by the plans and specifications heretofore adopted by the first party is covered by letters patent, all royalties and expenses thereof, all litigation therefrom, or other things whatsoever, which may develop as a

cost from the use of such material, composition, process or any other thing which is covered by letters patent shall be borne by the second party.

14. That any alteration or alterations made in the plans and specifications which are a part of this contract or any provision of this contract shall not operate to release any surety or sureties from liability on any bond or bonds attached hereto and made a part hereof, and consent to make such alterations is hereby given, and the sureties to said bonds hereby waive the provisions of Sections 2819 and 2840, and each of them, of the Civil Code of the State of California.

15. That said second party and all subcontractors under it shall pay all their laborers, workmen, mechanics and employees on said work a salary or wage at least equal to the prevailing salary or wage for the same quality of service rendered to private persons, firms or corporations under similar employment, and which salary or wage shall not be less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the work is performed, and not less than the general prevailing rate of per diem wages for legal holiday and overtime work, and which salary or wage shall not be less than the stipulated rates contained in a schedule thereof which has been ascertained and determined by the Board of Directors of the first party and which is now on file with the Secretary of said Board and by reference incorporated herein, and made a part hereof, and a copy

of which is hereto appended and marked "Exhibit A." The said second party hereby agrees to forfeit as a penalty to the said first party, out of any moneys becoming due to it from the said first party, under the terms of this contract the sum of Ten ($10.00) Dollars for each laborer, workman or mechanic employed, for each calendar day, or portion thereof, such laborer, workman or mechanic is paid less than the said stipulated rates for work done under this contract, by it, or by any subcontractor under it in violation of Chapter 397 of the Laws of 1931 of the State of California, and that the first party is hereby authorized and directed, through its proper representatives, to withhold and retain from the said second party, or from the subcontractors under it all sums and amounts which shall have been forfeited pursuant to this stipulation, as the property of the said first party, as provided by Chapter 397 of the Laws of 1931 of the State of California, and any Act or Acts amendatory thereof; provided, however, that no sum shall be so withheld, retained or forfeited, except from the final payment, without a full investigation by either the Division of Labor Statistics and Law Enforcement of the State Department of Industrial Relations or by said Board of Directors.

16. That the said second party and any subcontractor or subcontractors under it, shall not knowingly employ or cause or allow to be employed upon the work, or upon any part of the work contemplated by this contract, any alien, except in cases of

extraordinary emergency caused by fire, flood, or danger to life or property, or except upon public, military or naval defenses or works in time of war; provided, however, that within thirty (30) days after any alien is permitted to work thereon due to such an extraordinary emergency, the contractor doing the work, or its duly authorized agent, shall file with the Board of Directors a report, verified by oath, setting forth the nature of the said emergency and containing the name of the said alien and each date he was permitted to work, and failure to file the said report within the said time shall be prima facie evidence that no such extraordinary emergency existed. The contractor and each subcontractor shall also keep, or cause to be kept, an accurate record showing the names and citizenship of all workers employed by him in connection with the said public work, which record shall be open at all reasonable hours to the inspection of the Board of Directors, its deputies and agents, and to the Chief of the Division of Labor Statistics and Law Enforcement of the State Department of Industrial Relations, his deputies and agents. The said second party hereby agrees to forfeit to the said first party, out of any moneys becoming due to it from the said first party, under the terms of this contract the sum of Ten ($10.00) Dollars for each alien knowingly employed in the execution of this contract, by it or by any subcontractor under it, upon said work herein specified, for each calendar day, or portion thereof, during which such alien is permitted or required to labor

in violation of the provisions of Chapter 398 of the Laws of 1931 of the State of California, and that the first party is hereby authorized and directed, through its proper representatives, to withhold and retain from the said second party, or from any subcontractor under it, all sums and amounts which shall have been forfeited pursuant to this stipulation, as the property of the said first party, as provided by Chapter 398 of the Laws of 1931 of the State of California, and any Act or Acts amendatory thereof; provided, however, that no sum shall be so withheld, retained or forfeited, except from the final payment, without a full investigation by either the Division of Labor Statistics and Law Enforcement of the State Department of Industrial Relations or by said Board of Directors.

17. That no laborer, workman or mechanic employed at any time by the said second party, or by any subcontractor or subcontractors under it, upon the work or upon any part of the work contemplated by this contract, shall be required or permitted to work thereupon more than thirty hours during any one calendar week, except in cases of extraordinary emergency caused by fire, flood or danger to life or property, or except to work upon public military or naval defenses or works in time of war; provided, however, that within thirty (30) days after any employee is permitted to work over thirty hours during any one calendar week due to such extraordinary emergency, the contractor or its duly authorized agent shall file with the Board of

Directors of the first party a report verified by oath setting forth the nature of the said emergency, which report shall contain the name of said worker and the hours worked by him during said week, and failure to file the said report within the said time shall be prima facie evidence that no extraordinary emergency existed. The contractor and each subcontractor shall also keep an accurate record showing the names and actual hours worked of all workers employed by him in connection with the said public work, which record shall be open at all reasonable hours to the inspection of the Board of Directors of the first party or its deputies or agents, and to the Chief of the Division of Labor Statistics and Law Enforcement of the Department of Industrial Relations, his deputies or agents. The said second party hereby agrees to forfeit as a penalty to the said first party, out of any moneys becoming due to it from the said first party, under the terms of this contract, the sum of Ten ($10.00) Dollars for each laborer, workman or mechanic employed in the execution of this contract by said second party, or by any subcontractor under said second party, for each and every calendar day of each week during which said laborer, workman or mechanic is required or permitted to labor more than thirty hours in violation of the provisions of Section 653c-1 of the Penal Code of the State of California, and that the said first party is hereby authorized and directed through its proper representatives, to withhold and retain from the said second

party, or from the said subcontractors under it, all sums and amounts which shall have been forfeited pursuant to this stipulation, as the property of the said first party, as provided for by Section 653c-1 of the Penal Code of the State of California, and any Act or Acts amendatory thereof; provided, however, that no sum shall be so withheld, retained or forfeited, except from the final payment, without a full investigation by either the Division of Labor Statistics and Law Enforcement of the State Department of Industrial Relations or by said Board of Directors.

18. That only materials and supplies substantially produced in the United States shall be used. In accordance with Chapter 226 of the Laws of 1933, only such unmanufactured articles, materials and supplies as have been mined or produced in the United States and only such manufactured articles, materials and supplies as have been manufactured in the United States, substantially all from articles, materials and supplies mined, produced or manufactured, as the case may be, in the United States shall be used in the performance of the contract. If the contractor shall fail to comply with this provision of the Laws of 1933, he shall not be awarded any contract to which this act applies by the first party for a period of three years from the date of such violation.

19. That said Joint Highway District shall not in any way or manner be answerable or suffer loss, damage, expense or liability for any loss or damage

that may happen to said highway, highway tunnel, the appurtenances thereof, or any part thereof, or in, or about the same during its construction and before acceptance, and the said second party shall assume all liabilities of every kind or nature arising from said work, either by accident, negligence or any cause whatever; and shall hold the first party harmless from all liability of every kind and nature arising from accident, negligence or any cause whatever; save and except in the event of damage to said tunnel, shaft or any other underground structure comprising a portion of the work to be performed under this contract, resulting from an earthquake, the second party shall not be liable for any expense necessary to restore such tunnel, shaft or underground structure to a condition equivalent to that which existed prior to the occurrence of said earthquake, in excess of the sum of Five Thousand ($5,000) Dollars; provided that the second party shall be responsible for and shall repair at its own cost and expense any such damage not discovered and reported to the District Engineer by the second party in writing within forty-eight (48) hours after its occurrence; and provided further, that such repair work directly due to earthquake action discovered and reported as herein provided for in excess of Five Thousand ($5,000) Dollars for each earthquake, will be paid for as extra work except for such portions thereof as can be fairly classified under appropriate items of the contract, which portions shall be paid for at the

unit prices hereinbefore set forth; that no payment shall be made by the first party to the second party for loss of time or extra cost due to delays resulting directly or indirectly from such cause. If completion of the whole work is delayed due to earthquake damage, an extension of time shall be granted to the second party as set forth in section 4 of the specifications.

The term "earthquake" as used herein shall be limited to seismic disturbances recorded by recognized observatories in Northern California which have an intensity at the work of VII or more on the Rossi-Forel seismic intensity scale, and for the purposes of this proviso, any series of such seismic disturbances occurring within any one twenty-four (24) hour period shall be considered as a single earthquake.

20. The following rules and regulations adopted by the Federal Emergency Administration of Public Works, (hereinafter called the "Administrator") to carry out the purposes and control the Administration of Title II of the National Industrial Recovery Act, are required to be and form a part, of all the construction contracts on projects to which a grant has been made under the terms of said Act, and a grant having been made by the United States under the terms of said Act to the project for which this is the construction contract, the same are hereby made a part hereof, binding on all parties to this contract, to-wit:

1. (a) Convict labor.—No convict labor shall be employed on the project, and no materials manufactured or produced by convict labor shall be used on the project.

(b) Thirty-hour week.—Except in executive, administrative, and supervisory positions, so far as practicable and feasible in the judgment of the Government Engineer, no individual directly employed on the project shall be permitted to work more than 8 hours in any 1 day nor more than 30 hours in any one week:

Provided, That this clause shall be construed to permit working time lost because of inclement weather or unavoidable delays in any 1 week to be made up in the succeeding 20 days.

2. Wages.—(a) All employees directly employed on this work shall be paid just and reasonable wages which shall be compensation sufficient to provide, for the hours of labor as limited, as standard of living in decency and comfort. Such wages shall in no event be less than the minimum hourly wage rates for skilled and unskilled labor prescribed by the Administrator for the zone or zones in which the work is to be done, viz:

Skilled labor, One and 10/100ths ($1.10) Dollars;

Unskilled labor, 45/100ths ($0.45) Dollars.

(b) In the event that the prevailing hourly rates prescribed under collective agreements or understandings between organized labor and employers in effect on April 30, 1933, shall be above the minimum rates specified above, such agreed

wage rates shall apply: Provided, That such agreed wage rates shall be effective for the period of this contract, but not to exceed 12 months from the date of the contract.

(c) The above designated minimum rates are not to be used in discriminating against assistants, helpers, apprentices, and serving laborers who work and serve skilled journeymen mechanics and who are not to be termed as "unskilled laborers."

(d) The provisions of this contract relating to hours and minimum wage rates for labor directly employed on the project shall for the purposes of this contract, to the extent applicable, supersede the terms of any code adopted under Title I of the Act permitting longer hours or lower minimum wage rates.

(e) All employees shall be paid in full not less often than once each week and in lawful money of the United States, unless otherwise permitted by the Government Engineer, in the full amount accrued to each individual at the time of closing of the pay roll, which shall be at the latest date practicable prior to the date of payment, and there shall be no deductions or rebates on account of goods purchased, rent, or other obligations, but such obligations shall be subject to collection only by legal process: Provided, however, That this clause shall not be construed to prohibit the making of deductions for premiums for compensation and medical aid insurance, in such amounts as are authorized by the laws of the State of California to be paid by employees, in those cases in which, after the mak-

ing of the deductions, the wage rates will not be lower than the minimum wage rates herein established.

(f) A clearly legible statement of all wage rates to be paid the several classes of labor employed on the work, together with a statement of the deductions therefrom for premiums for workmen's compensation and/or medical aid insurance authorized by the laws of the State of California, should such deductions be made, shall be posted in a prominent and easily accessible place at the site of the work, and there shall be kept a true and accurate record of the hours worked by and the wages, exclusive of all authorized deductions, paid to each employee, and the engineer inspector shall be furnished with a sworn statement thereof on demand.

(g) The Board of Labor Review (herein called the "Board") shall hear all labor issues arising under the operation of this contract and such issues as may result from fundamental changes in economic conditions during the life of this contract.

(h) The minimum wage rates herein established shall be subject to change by the Administrator on recommendation of the Board. In the event that, as a result of fundamental changes in economic conditions, the Administrator, acting on such recommendation, from time to time establishes different minimum wage rates (referred to in paragraph 2 (a), (b), and (c) hereof) all contracts for work on the project shall be adjusted accordingly by the parties thereto so that the contract price to

the contractor under any contract or to any subcontractor under any subcontract shall be increased by an amount equal to any such increased cost, or decreased in an amount equal to such decreased cost.

(i) Engineers, architects, and other professional and subprofessional employees engaged on the project shall receive the prevailing local rates for the various types of service to be rendered, except that in no case shall they receive less than the hourly rates set for the highest paid class of skilled labor directly employed on the project.

(j) Superintendents and foremen shall receive an hourly rate of compensation at least equal to the hourly wage rate paid employees who work under their direction, up to 40 hours per week.

In the event that superintendents or foremen work more than 40 hours per week, they shall receive at least 50 per cent more than the weekly wage, on a 30-hour basis, of the men working under their immediate direction.

The above are minimum rates only, and shall be determined prior to entering on the work.

3. (a) Labor Preferences.—Section 206 of the National Industrial Recovery Act establishes preferences to be followed in the employment of labor. As between fully qualified applicants for the positions these preferences will be observed as follows:

1. Ex-service men with dependents who are residents of Joint Highway District No. 13.

2. Other citizens and aliens who have declared their intention of becoming citizens who are bona fide residents of Joint Highway District No. 13.

3. Ex-service men with dependents who are bona fide residents of the State of California.

4. Other citizens and aliens who have declared their intentions of becoming citizens who are bona fide residents of the State of California.

(b) Employment services.—To the fullest extent possible, labor required for the project and appropriate to be secured through employment services shall be chosen from the lists of qualified workers submitted by local employment agencies designated by the United States Employment Service: Provided, however, That union labor, skilled and unskilled, shall not be required to register at such local employment agencies, but, if such labor is desired by the employer, shall be secured in the customary ways through recognized union locals. In the event, however, that employers who wish to employ union labor are not furnished with qualified union workers by the union locals which are authorized to furnish such labor residing in the locality within 48 hours (Sundays and holidays excluded) after request is filed by the employer, all labor shall be chosen from lists of qualified workers submitted by local agencies designated by the United States Employment Service. In the selection of workers from lists prepared by such employment agencies and union locals, the labor preferences provided in section (a) of this paragraph 3 shall be observed,

and preference shall be given to those unemployed at the date of registration who, at the date of selection, have no other available employment.

(c) Compliance with Title 1 of the Act.—The following sections 7 (a) (1) and 7 (a) (2) of Title 1 of the Act shall be observed:

(1) That employees shall have the right to organize and bargain collectively through representatives of their own choosing, and shall be free from the interference, restraint, or coercion of employers of labor, or their agents, in the designation of such representatives or in self-organization or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection; (2) that no employee and no one seeking employment shall be required as a condition of employment to join any company union or to refrain from joining, organizing or assisting a labor organization of his own choosing.

4. Human labor.—The maximum of human labor shall be used in lieu of machinery wherever practicable and consistent with sound economic and public advantage; and to the extent that the work may be accomplished at no greater expense by human labor than by the use of machinery, and labor of requisite qualifications is available, such human labor shall be employed.

5. Compensation insurance.—Every employer of labor shall provide, if permitted by the laws of the State of California, adequate workmen's compensation insurance for all labor employed by him on

the project who may come within the protection of such laws and shall provide, where practicable, employers' general liability insurance for the benefit of his employees not protected by such compensation laws, and proof of such insurance satisfactory to the Government engineer shall be given. Where it is not permitted by law that such insurance be provided, some method satisfactory to the Administrator must be provided by which the employees may, by paying the entire amount of the premiums, derive a similar protection.

6. Persons entitled to benefits of labor provisions.—There shall be extended to every person who performs the work of a laborer or of a mechanic on the project or on any part thereof the benefits of the labor and wage provisions of this contract, regardless of any contractual relationship between the employer and such laborer or mechanic. There shall be no discrimination in the selection of labor on the ground of race, creed, or color.

7. Withholding payment.—Under all construction contracts, said Joint Highway District No. 13 of the State of California, may withhold from the contractor so much of accrued payments as may be necessary to pay to laborers or mechanics employed on the work the difference between the rate of wages required by this contract to be paid to laborers or mechanics on the work and the rate of wages actually paid to such laborers or mechanics.

8. Accident prevention.—Reasonable precau-

tions shall at all times be exercised for the safety of employees on the work and applicable provisions of the Federal, State, and municipal safety laws and building and construction codes shall be observed. All machinery and equipment and other physical hazards shall be guarded in accordance with the safety provisions of the Manual of Accident Prevention in Construction of the Associated General Contractors of America, unless and to the extent that such provisions are incompatible with Federal, State, or municipal laws or regulations.

9. (a) N. R. A. materials.—So far as articles, materials, and supplies produced in the United States are concerned, only articles, materials, and supplies produced under codes of fair competition under Title 1 of the Act, or under the President's Reemployment Agreement, shall be used in the performance of this work, except when the Government engineer certifies that this requirement is not in the public interest or that the consequent cost is unreasonable.

(b) Local preference.—So far as practicable, and subject to the provisions of section (a) of this paragraph 9, preference shall also be given to the use of locally produced materials if such does not involve higher cost, inferior quality, or insufficient quantities, subject to the determination of the Government engineer; but there shall be no requirement providing price differentials for, or restricting the use of materials to, those produced within the Nation or State.

10. (a) Inspection of records.—The Administrator, through his authorized agents, shall have the right to inspect all work as it progresses, and shall have access to all pay rolls, records of personnel, invoices of materials, and any and all other data relevant to the performance of this contract. There shall be submitted to the Administrator, through his authorized agents, the names and addresses of all personnel and such schedules of the cost of labor, costs and quantities of materials, and other items, supported as to correctness by such evidence as, and in such form as, the Administrator, through his authorized agents, may require. The submission and approval of said schedules, if required, shall be a condition precedent to the making of any payment under the contract.

(b) There shall be provided for the use of the engineer inspector such reasonable facilities as he may request. In case of dispute the Government engineer shall determine the reasonableness of the request.

11. (a) Reports.—Every employer of labor on the project shall report within 5 days after the close of each calendar month, on forms to be furnished by the United States Department of Labor, the number of persons on their respective pay rolls directly connected with the project, the aggregate amounts of such pay rolls, and the man-hours work, wage scales paid to the various classes of labor, and the total expenditures for materials. Two copies of each of such monthly reports are to be furnished to

the Government engineer, and one copy of each to the United States Department of Labor.

The contractor under any construction contract shall also furnish to said Joint Highway District No. 13 of the State of California, to the Government Engineer, and to the United States Department of Labor the names and addresses of all subcontractors on the work at the earliest date practicable.

(b) Copies, in triplicate, of all pay rolls for work performed under this contract, whether done by the contractor or under a subcontract or otherwise, prepared on approved forms and certified under oath by the contractor or his authorized representative, shall be filed with the District Engineer, within five (5) days after the close of each calendar month, showing the name of each employee, the State and county of his bona fide residence, the agency from which his name was obtained, whether or not an ex-service man with dependents, the class of work performed, the hours worked each day, the total hours for each calendar week, the total hours for the month, the wage rate paid, the total amount earned, deductions for board and lodging, if any, and the net amount paid.

The pay rolls shall be divided into three (3) sections under which shall be appropriately grouped:

(1) Executive, administrative and supervisory employees.

(2) Skilled labor.

(3) Unskilled labor.

Each of these classifications shall be grouped separately and the totals for each group shown under the following headings: hours per week, hours for the month, amount earned, deductions and net amount paid.

12. Signs.—Signs bearing the legend Public Works Project No. 2231 shall be erected in appropriate places at the site of the project.

13. All reasonable rules and regulations which the Public Works Administration may prescribe toward the effectuation of the matters covered by paragraphs 1 to 12, inclusive, shall be observed in the performance of the work.

14. Subcontractors.—(a) Appropriate provisions shall be inserted in all subcontracts relating to this work to insure the fulfillment of all provisions of this contract affecting such subcontractors, particularly paragraphs 1 to 13, inclusive.

(b) No bid shall be received from any subcontractor who has not signed U. S. Government Form No. P. W. A. 61, revised (March, 1934).

15. Termination for breach.—In the event that any of the provisions of subdivisions 1 to 14 inclusive, of this paragraph 20 of this contract, are violated by the contractor under the construction contract or by any subcontractor under any subcontract on the work, said Joint Highway District No. 13 of the State of California, may, subject to the approval of the Government Engineer, and upon request of the Administrator, shall terminate the contract by serving written notice upon the contractor of its intention to terminate such contract, and, un-

less within 10 days after the serving of such notice such violation shall cease, the contract shall, upon the expiration of said 10 days, cease and terminate. In the event of any such termination said Joint Highway District No. 13 of the State of California may take over the work and prosecute the same to completion or otherwise for the account and at the expense of the contractor and/or such subcontractor, and the contractor and his sureties shall be liable to said Joint Highway District No. 13 of the State of California for any excess cost occasioned said Joint Highway District in the event of any such termination, and said Joint Highway District may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the site of the work, and necessary therefor. This clause shall not be construed to prevent the termination for other causes provided in the construction contract.

16. Definitions.—The term "Act" as used herein refers to the National Industrial Recovery Act. The term "Government Engineer" as used herein shall mean the State engineer (P. W. A.) or his duly authorized representative, or any person designated to perform his duties or functions under this agreement by the Administrator. The term "engineer inspector" as used herein refers to State engineer inspectors, resident and assistant resident engineer inspectors, and supervising engineers, appointed by the Administrator. The term "materials" as used herein includes, in addition to materials incorporated in the project used or to be used in the opera-

tion thereof, equipment and other materials used and/or consumed in the performance of the work.

21. The contractor shall comply with each approved code of fair competition to which he is subject, and if he is engaged in any trade or industry for which there is no approved code of fair competition, then as to such trade or industry with an agreement with the President under Section 4 (a) of the National Industrial Recovery Act (President's Reemployment Agreement), and the said Joint Highway District No. 13 shall have the right to cancel this contract for failure to comply with this provision and may have the work called for by this contract otherwise performed at the expense of the contractor, and the contractor shall not accept or purchase for the performance of this contract or enter into any subcontracts for any articles, materials, or supplies in whole or in part produced or furnished by any person who shall not have certified that he is complying with and will continue to comply with each code of fair competition which relates to such articles, materials, or supplies, and/or in case there is no approved code for the whole or any portion thereof then to that extent with an agreement with the President as aforesaid.

22. Any person falsely certifying as to compliance as aforesaid who submits any such proposal, bid, contract, or subcontract, or accepts any purchase order, may be punished as provided in section 10 (a) of the National Industrial Recovery Act, by a fine of not to exceed Five Hundred ($500.00) Dollars or imprisonment not to exceed

six months, or both, and in event of any such false certification by any such person, any contract, subcontract, or purchase order to which he is party secured by or in furtherance of any such proposal or bid may be canceled by the other party thereto, and the unfinished portion thereof completed at the expense of the person guilty of such false certification and his sureties, if any.

23. Whenever a dispute shall arise between any agency of the said Joint Highway District No. 13, and any bidder, contractor, supplier or other person as to compliance with any code of fair competition or with an agreement with the President as aforesaid in connection with any proposal, bid, contract, subcontract, or purchase order mentioned herein, the Administrator for Industrial Recovery, or such agency as he shall designate, shall decide such dispute, and, for the purposes of action under the President's Executive order, such decision shall be final and conclusive; but the determination of such agency of the said Joint Highway District No. 13 shall be effective for all purposes pending such decision.

24. It is understood and agreed by both parties hereto that the per diem wages listed in Exhibit "A", attached hereto, are based on the customary eight (8) hour working day, and that when less time is worked per day, the amount paid therefor shall be the hourly rate set forth in said Exhibit "A", multiplied by the number of hours worked.

25. In the event that any provision of this contract is in conflict with the final specifications for the work to be done hereunder, adopted March 30, 1933, and the amendments and supplements adopted on January 9, 1934, and on April 3, 1934, respectively, by the Board of Directors of said Joint Highway District No. 13 of the State of California, it is understood and agreed that the provisions of this contract shall govern, and shall supersede said specifications in every case where such conflict or conflicts exist.

In Witness Whereof, the said parties hereto have caused their respective corporate names to be signed and their corporate seals to be affixed by their respective Presidents and Secretaries, thereunto duly authorized, the day and year first above written.

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

By THOMAS E. CALDWELL
President

By HARRY M. STOW
Secretary

First Party

SIX COMPANIES OF CALIFORNIA, a corporation,

By A. D. BECHTEL
President

By EDGAR KAISER
Secretary

Second Party

Exhibit A

RESOLUTION ASCERTAINING AND DETERMINING GENERAL PREVAILING RATE OF PER DIEM WAGES TO BE PAID ON THE PROJECT OF JOINT HIGHWAY DISTRICT No. 13 OF THE STATE OF CALIFORNIA.

Whereas this Board of Directors is about to call for bids for the construction of the project of Joint Highway District No. 13 of the State of California, including construction of a highway, highway tunnel and approaches with appurtenant structures in the said District,

Now, Therefore, after an investigation of the general prevailing rate of per diem wages paid in the Counties of Alameda and Contra Costa, the locality in which the work is to be performed, for each craft or type of workman or mechanic needed to execute the contract for the project of the District, it is hereby

Resolved, that the following schedule of rates of per diem wages is hereby adopted, fixed, ascertained and established to be paid by the Contractor and subcontractors on said project for each craft or type of workman or mechanic employed to execute the contract, and that said schedule is a schedule of the general prevailing rate of per diem wages in said locality, to-wit:

Position	Per Diem Rate	Hourly Rate
Blacksmith	$ 8.80	$ 1.10
Carpenter	8.80	1.10
Cement gun operator	6.00	.75
Compression engineer	10.00	1.25
Concrete finisher, pavement	8.80	1.10
Concrete laborers	6.24	.78
Concrete mixer operator	10.00	1.25
Drill operator	6.00	.75
Electrical worker	8.80	1.10
Grader operator	6.00	.75
Labor, unskilled	4.80	.60
Machinist	8.80	1.10
Mechanic	8.80	1.10
Painter	8.80	1.10
Plasterer	11.00	1.375
Plumber	8.80	1.10
Portable hoist engineer	10.00	1.25
Powder man	7.00	.875
Power shovel operator	10.00	1.25
Roller operator	9.00	1.125
Sheet metal worker	9.44	1.18
Steam fitter	10.00	1.25
Steel worker, reinforcing	9.00	1.125
Steel worker, structural	11.00	1.375
Subgrade finisher operator	6.00	.75
Teamster	6.00	.75
Tractor driver, 50 h.p. and under	7.00	.875
Tractor driver, over 50 h.p.	9.00	1.125
Truck driver, 2 yds.	5.50	.6875
Truck driver, 3 yds.	6.00	.75
Truck driver, 4 yds.	6.50	.8125
Truck driver, 5 yds.	6.50	.8125
Truck driver, 6 yds.	6.50	.8125
Not Otherwise Covered		
Skilled	$ 8.80	$ 1.10
Unskilled	3.60	.45

For laborers, workmen and mechanics employed thirty hours a week, the general prevailing rate for work on Sundays and all other legal holidays is

hereby fixed as the rate for the same craft or type of workman on days other than Sunday and legal holidays; provided, however, as the project for which said bids are to be called has received a grant of funds under the provisions of The National Industrial Recovery Act, and that all proceedings for the construction of said project are taken subject to rules and regulations of the Public Works Administration which has heretofore promulgated "Bulletin No. 2," paragraph (c) of Art. A of Section B of which provides as follows: "(c) No work shall be permitted on Sundays or legal holidays except in cases of emergency"; and that said Joint Highway District has applied for a waiver of the provisions of said paragraph (c) which has not been acted upon at the time of the adoption of this schedule of prevailing wages by said Joint Highway District; in the event said waiver is not obtained and said paragraph (c) remains in effect as to work on said project, that the general prevailing rate for work on Sundays and all other legal holidays is hereby fixed as and shall be at the rate of twice the rate fixed herein for the same craft or type of workman on days other than Sunday and legal holidays.

All overtime work shall be at the rate of one and one-half times the regular hourly rate for each hour of overtime worked for each craft or type of workman employed as hereinabove set forth.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. No. 20101-R. Plff's Ex. No. 16. Filed April 13, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

PLAINTIFF'S EXHIBIT No. 18

BOND FOR FAITHFUL PERFORMANCE

Know All Men by These Presents:

That we, Six Companies of California, a Nevada Corporation, herein referred to as "Contractor" as Principal, and Hartford Accident and Indemnity Company, a Connecticut Corporation, Fidelity and Deposit Company of Maryland, a Maryland Corporation, The Aetna Casualty and Surety Company, a Connecticut Corporation, Indemnity Insurance Company of North America, a Pennsylvania Corporation, American Surety Company of New York, a New York Corporation, Fireman's Fund Indemnity Company, a California Corporation, Maryland Casualty Company, a Maryland Corporation, United States Fidelity and Guaranty Company, a Maryland Corporation, The Fidelity and Casualty Company of New York, a New York Corporation, Glens Falls Indemnity Company, a New York Corporation, Standard Surety and Casualty Company of New York, a New York Corporation, Standard Accident Insurance Company, a Michigan Corporation, Pacific Indemnity Company, a California Corporation, Massachusetts Bonding and Insurance Company, a Massachusetts Corporation, Continental Casualty Company, an Indiana Corporation, and New Amsterdam Casualty Company, a New York Corporation, as Sureties, are held and firmly bound unto Joint Highway District No. 13 of the State of California, a public corporation of the State of Cali-

fornia, in the sum of One Million Eight Hundred Forty-two Thousand Dollars ($1,842,000.00), lawful money of the United States of America, for the payment whereof, well and truly to be made, we hereby bind ourselves, our heirs, administrators, successors and assigns, firmly by these presents, as follows:

The Principal and Hartford Accident and Indemnity Company, a Connecticut Corporation, as Surety, jointly and severally, in a sum equal to ten per centum (10%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Hartford Accident and Indemnity Company, a Connecticut Corporation, hereunder exceed the amount of One Hundred Eighty-four Thousand Two Hundred Dollars ($184,200.00);

The Principal and Fidelity and Deposit Company of Maryland, a Maryland Corporation, as Surety, jointly and severally, in a sum equal to ten per centum (10%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Fidelity and Deposit Company of Maryland, a Maryland Corporation, hereunder exceed the amount of One Hundred Eighty-four Thousand Two Hundred Dollars ($184,200.00);

The Principal and The Aetna Casualty and Surety Company, a Connecticut Corporation, as Surety, jointly and severally, in a sum equal to ten per centum (10%) of the total amount of each claim recoverable hereunder, but in no event shall

the aggregate liability of The Aetna Casualty and Surety Company, a Connecticut Corporation, hereunder exceed the amount of One Hundred Eighty-four Thousand Two Hundred Dollars ($184,200.00);

The Principal and Indemnity Insurance Company of North America, a Pennsylvania Corporation, as Surety, jointly and severally, in a sum equal to ten per centum (10%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Indemnity Insurance Company of North America, a Pennsylvania Corporation, hereunder exceed the amount of One Hundred Eighty-four Thousand Two Hundred Dollars ($184,200.00);

The Principal and American Surety Company of New York, a New York Corporation, as Surety, jointly and severally, in a sum equal to ten per centum (10%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of American Surety Company, a New York Corporation, hereunder exceed the amount of One Hundred Eighty-four Thousand Two Hundred Dollars ($184,200.00);

The principal and Fireman's Fund Indemnity Company, a California Corporation, as Surety, jointly and severally, in a sum equal to seven per centum (7%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Fireman's Fund Indemnity Company, a California Corporation, hereunder exceed

the amount of One Hundred Twenty-eight Thousand Nine Hundred Forty Dollars ($128,940.00);

The Principal and Maryland Casualty Company, a Maryland Corporation, as Surety, jointly and severally, in a sum equal to six and one-half per centum (6½%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Maryland Casualty Company, a Maryland Corporation, hereunder exceed the amount of One Hundred Nineteen Thousand Seven Hundred Thirty Dollars ($119,730.00);

The Principal and United States Fidelity and Guaranty Company, a Maryland Corporation, as Surety, jointly and severally, in a sum equal to six and one-half per centum (6½%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of United States Fidelity and Guaranty Company, a Maryland Corporation, hereunder exceed the amount of One Hundred Nineteen Thousand Seven Hundred Thirty Dollars ($119,730.00);

The Principal and The Fidelity and Casualty Company of New York, a New York Corporation, as Surety, jointly and severally, in a sum equal to five per centum (5%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Fidelity and Casualty Company of New York, a New York Corporation, hereunder exceed the amount of Ninety-two Thousand One Hundred Dollars ($92,100.00);

The Principal and Glens Falls Indemnity Company, a New York Corporation, as Surety, jointly and severally, in a sum equal to four and one-half per centum (4½%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Glens Falls Indemnity Company, a New York Corporation, hereunder exceed the amount of Eighty-two Thousand Eight Hundred Ninety Dollars ($82,890.00);

The Principal and Standard Surety and Casualty Company of New York, a New York Corporation, as Surety, jointly and severally, in a sum equal to four per centum (4%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Standard Surety and Casualty Company of New York, a New York Corporation, hereunder exceed the amount of Seventy-three Thousand Six Hundred Eighty Dollars ($73,680.00);

The Principal and Standard Accident Insurance Company, a Michigan Corporation, as Surety, jointly and severally, in a sum equal to four per centum (4%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Standard Accident Insurance Company, a Michigan Corporation, hereunder exceed the amount of Seventy-three Thousand Six Hundred Eighty Dollars ($73,680.00);

The Principal and Pacific Indemnity Company, a California Corporation, as Surety, jointly and severally, in a sum equal to four per centum (4%)

of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Pacific Indemnity Company, a California Corporation, hereunder exceed the amount of Seventy-three Thousand Six Hundred Eighty Dollars ($73,680.00);

The Principal and Massachusetts Bonding and Insurance Company, a Massachusetts Corporation, as Surety, jointly and severally, in a sum equal to four per centum (4%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Massachusetts Bonding and Insurance Company, a Massachusetts Corporation, hereunder exceed the amount of Seventy-three Thousand Six Hundred Eighty Dollars ($73,680.00);

The Principal and Continental Casualty Company, an Indiana Corporation, as Surety, jointly and severally, in a sum equal to two and one-half per centum (2½%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of Continental Casualty Company, an Indiana Corporation, hereunder exceed the amount of Forty-six Thousand Fifty Dollars ($46,050.00);

The Principal and New Amsterdam Casualty Company, a New York Corporation, as Surety, jointly and severally, in a sum equal to two per centum (2%) of the total amount of each claim recoverable hereunder, but in no event shall the aggregate liability of New Amsterdam Casualty

Company, a New York Corporation, hereunder exceed the amount of Thirty-six Thousand Eight Hundred Forty Dollars ($36,840.00).

The condition of the foregoing obligation is such that:

Whereas, said Contractor has been awarded and is about to enter into the annexed contract with the said Joint Highway District No. 13 of the State of California for the construction of a highway, highway tunnel and appurtenances in accordance with the final plans and specifications therefor adopted by the Board of Directors of said Joint Highway District No. 13 on the 30th day of March, 1933, and the amendments and supplements thereto adopted by said Board on the 9th day of January, 1934, and on the 3d day of April, 1934, and is required by said Joint Highway District to give this bond in connection with the execution of said contract;

Now, Therefore, if the said Contractor shall well and truly do and perform all of the covenants and obligations of said contract on its part to be done and performed at the time and in the manner specified therein, then this obligation shall be null and void, otherwise it shall be and remain in full force and effect. It is expressly agreed that any suit or suits that may be brought to enforce the obligation hereof may be commenced and prosecuted jointly and severally against all or any of the persons and parties named herein.

Provided, that any alterations in the work to be done, or the material to be furnished which may be made pursuant to the terms of said contract shall not in any way release the Contractor or the sureties hereunder, nor shall any extensions of time granted under the provisions of said contract release either the Contractor or sureties, and notice of such alteration or extensions of the contract is hereby waived by the sureties.

Witness our hands this 12th day of June, 1934.

SIX COMPANIES
OF CALIFORNIA,
a Nevada Corporation,
[Corporate Seal] By S. D. BECHTEL,
President,
W. E. WASTE,
Asst. Sec. & Asst. Treas.
Contractor.

HARTFORD ACCIDENT AND
INDEMNITY COMPANY,
a Connecticut corporation,
By A. C. POSEY,
Attorney-in-Fact.

FIDELITY AND DEPOSIT
COMPANY OF MARYLAND,
a Maryland Corporation,
By LELAND W. CUTLER,
Attorney-in-Fact,
VERNON G. PEIRSON,
Agent.

THE AETNA CASUALTY AND SURETY COMPANY,
a Connecticut Corporation,
By J. A. SWEARINGEN,
Resident Vice President,

Attest: R. F. LITTLE,
Resident Asst. Secretary.

INDEMNITY INSURANCE COMPANY OF NORTH AMERICA,
a Pennsylvania Corporation,
By HARRY C. MILLER,
Attorney-in-Fact.

AMERICAN SURETY COMPANY OF NEW YORK,
a New York Corporation,
By R. D. WELDON,
Resident Vice President,

Attest: B. DUCRAY,
Resident Assistant Secretary.

FIREMAN'S FUND INDEMNITY COMPANY,
a California Corporation,
By F. J. BUTCHER,
Attorney-in-Fact.

MARYLAND CASUALTY COMPANY,
a Maryland Corporation,
By W. G. KELSO,
Attorney-in-Fact.

UNITED STATES FIDELITY
AND GUARANTY COMPANY,
a Maryland Corporation,
By ERNEST W. COPELAND
Attorney-in-Fact,

THE FIDELITY AND
CASUALTY COMPANY
OF NEW YORK,
a New York Corporation,
By FRANK M. HALL,
Attorney.

GLENS FALLS INDEMNITY
COMPANY,
a New York Corporation,
By R. H. GRIFFITH,
Attorney.

STANDARD SURETY AND
CASUALTY COMPANY
OF NEW YORK,
a New York corporation,
By A. C. POSEY,
Attorney-in-Fact.

STANDARD ACCIDENT
INSURANCE COMPANY,
a Michigan Corporation,
By H. G. SHEEHY,
Attorney-in-Fact.

PACIFIC INDEMNITY
COMPANY,
a California Corporation,
By EARL A. DAVIS,
Attorney-in-Fact.

MASSACHUSETTS BONDING
AND INSURANCE
COMPANY,
a Massachusetts Corporation,
By J. R. McKINNEY,
Agent and Attorney-in-Fact.

CONTINENTAL CASUALTY
COMPANY,
an Indiana Corporation,
By B. F. CATOR,
Attorney-in-Fact.

NEW AMSTERDAM
CASUALTY COMPANY,
a New York Corporation,
By WALTER W. DERR,
Agent and Attorneyin-Fact.

State of California,
City and County of San Francisco—ss.

On this 12th day of June in the year one thousand nine hundred and thirty four before me, Lulu P. Loveland, a Notary Public in and for the City and County of San Francisco, State of California, residing therein, duly commissioned and sworn, personally appeared S. D. Bechtel and W. E. Waste known to me to be the President and Assistant Secretary-Assistant Treasurer, respectively, of the corporation that executed the within instrument, and also known to me to be the persons who executed

the within instrument on behalf of the corporation therein named, and acknowledged to me that such corporation executed the same.

In witness whereof, I have hereunto set my hand and affixed my official seal at my office in the City and County of San Francisco, the day and year in this certificate first above written.

[Seal] LULU P. LOVELAND,
Notary Public in and for the City and County of San Francisco, State of California.

My Commission expires December 8, 1934.

[Printer's Note: Parts of eight acknowledgments appear on the photostated exhibit which are undecipherable.]

State of California,
City and County of San Francisco—ss.

On this 12th day of June in the year one thousand nine hundred and thirty four before me J. G. Roberts a Notary Public in and for the said City and County of San Francisco residing therein, duly commissioned and sworn, personally appeared Frank M. Hall known to me to be the attorney of The Fidelity and Casualty Company of New York, the corporation that executed the within instrument and known to me to be the person who executed the said instrument on behalf of the Corporation therein named and acknowledged to me that such Corporation executed the same.

In witness whereof I have hereunto set my hand and affixed my official seal in the County of San Francisco the day and year in this certificate first above written.

[Seal] J. G. ROBERTS,
Notary Public in and for the City and County of San Francisco, State of California.

My Commission expires October 29, 1937.

[Printer's Note: Parts of six acknowledgments appear on the photostated exhibit which are undecipherable.]

State of California,
City and County of San Francisco—ss.

On this 12th day of June in the year one thousand nine hundred and thirty-four, before me Con T. Shea, a Notary Public in and for the said County and State, residing therein, duly commissioned and sworn, personally appeared Walter W. Derr known to me to be the duly authorized Agent and Attorney-in-Fact of the New Amsterdam Casualty Company, the corporation whose name is affixed to the foregoing instrument; and duly acknowledged to me that he subscribed the name of the New Amsterdam Casualty Company thereto as Surety and his own name as Attorney-in-Fact.

In witness whereof, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

CON T. SHEA

Notary Public in and for said County and State.

[Endorsed]: Filed June 14th, 1934. Harry M. Stow, Secretary, by L. V. Eaton, Asst. Secty.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Plff's Ex. No. 18. Filed April 13, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

PLAINTIFF'S EXHIBIT No. 22

REPORT ON THE GEOLOGICAL CONDITIONS

along the line of the proposed new low tunnel highway between Alameda and Contra Costa Counties:

Proposed New Tunnel Road;

From Broadway to Temescal Creek Crossing,

Temescal Creek Crossing, Stas. 43+23 to 53+10,

Temescal Dam,

The Railroad Crossing,

From Temescal Creek Crossing to Tunnel Portal;

Proposed Highway Tunnel;

West Portal,
Monterey (Sobrante?) Sandstone,
Claremont Cherts,
The Orinda Formation,
Tunnel Earthquake Relations,
Tunnel in General,
From the East Portal of Tunnel to Station 156+50.

By PROFESSOR GEORGE D. LOUDERBACK
Consulting Geologist

June 23, 1932

Geological Report

Berkeley, California
June 23, 1932

Mr. George A. Posey, District Engineer
Joint Highway District No. 13
454 Fifth Street, Oakland, California.

Dear Sir:

Proposed New Tunnel Road.

The following is a report on the geological conditions along the line of the proposed new low tunnel highway between Alameda and Contra Costa Counties, based on observations made on the ground surface along and in the vicinity of the proposed highway and tunnel line, with the aid of such clearing, cuts and artificial openings as were made up to June 18, 1932, supplemented by laboratory studies of some of the collected material. The proposed line is that indicated on the map entitled: Joint Highway District No. 13, Topography from Broadway to West Portal, Nov. 6, 1930, and corresponding profile dated March, 1931, and on the plan and profile of tunnel dated May, 1932, and in geological cross section dated July 7, 1930.

From the geological standpoint the proposed highway and tunnel appear to be quite feasible and the line chosen is probably as good a line as could have been selected to accomplish the desired results.

Naturally, the geological conditions vary along the route, different portions possessing local characteristics of rock type or structure that require special consideration or treatment by the engineer.

I shall describe and comment on these features in some detail in the order in which they would be encountered if one started from Broadway, Oakland, and followed the line of the proposed highway to the vicinity of the east portal of the tunnel. Locations of the conditions described will be indicated by reference to station numbers, corresponding to the stationing of the maps and profiles referred to above.

From Broadway to Temescal Creek Crossing.

At present there is a cliff-like cut in the bedrock along the southeast side of Broadway where the proposed new highway is to take off. From the junction of Brookside Avenue a basic igneous rock (greenstone) in the Franciscan formation extends southwestward along Broadway about 300 feet. It is largely weathered to a brown color. For about 150 feet from Brookside Avenue it is rather massive. Beyond this it is badly sheared and the shearing has involved and displaced small masses of shale. The rock here is weak and on steep slopes tends to slump. It has at times slumped down over the sidewalk and the detritus has been artificially removed. Farther along a small mass of chert is exposed which stands well, but picks down rather easily because of numerous poorly cemented closely spaced fractures. It is followed southwesterly by Franciscan sandstones and shales which also have suffered more or less shearing.

The various rock types and structures mentioned will all be encountered in the proposed cut for the

new road for several hundred feet from Broadway. In my opinion the material involved will make a satisfactory general foundation for the new road in the cut as planned. I believe that the only trouble that may be experienced would be the result of any steep exposed face in badly sheared rock. This would tend to slump, especially when wet. On the southeast side where a slope up from the road would be left by the cut, rock material might slump down onto the road. If steep slopes in badly sheared material were left below the road, as might happen on its northwest side, they might cause the edge of the pavement to be undermined and crumble away. As to whether the badly sheared parts of the bedrock would be exposed in such a way by the proposed cut as to make possible such minor troubles, can best be determined when the excavation is completed. Appropriate precautions can then be taken to prevent possible slumping. The distribution of rock types and shearing is too irregular to make it worthwhile trying to determine possible location of such weak zones before the actual cut is made.

Similar rocks are exposed in a quarry off of Brookside avenue, stations 15 to 17. The west wall of the quarry is of Franciscan chert with a practically vertical dip, and with strike along the quarry wall. It stands well on a steep slope. The rest of the quarry is mostly in Franciscan sandstones and shales, irregularly sheared, and showing here and there patches of greenstone, and chert. A small patch of chert occurs at the east end of the quarry

face curve (Sta. 17). Beyond the quarry, road cuts expose Franciscan sandstone and shale to about Station 18. Farther along the bedrock is covered, first by detritus (hill waste) of Franciscan rock types, and finally by alluvial wash down Rosewood Court gulch.

Near Stations 22+50 is a pit in badly sheared Franciscan sandstone and shale.

It is possible that Rosewood Court is a zone of faulting—a subordinate fracture zone related to the Hayward fault. This is suggested by the physiography, and by the fact that this feature is parallel to the Haywards fault zone and only about 900 feet distant from it. Proof of this might be difficult. It could possibly be determined by a pit or trench carried into bedrock through the alluvium of Rosewood Court.

The slope above Golden Gate Avenue (between Stations 23+50 and 26+00) in which a cut is proposed, exposes somewhat sheared Franciscan sandstone and shale with some spots of greenstone and narrow belts of sheared serpentine. This serpentine, as exposed, is not the common bouldery type of sheared serpentine; the shearing has produced a parallel shale-like structure. The rock types here, as near Broadway, are so irregularly distributed and sheared through one another that no prediction can be made as to the exact location of the separate types in the final cut. The same conditions may be encountered here as were outlined for the cut just off of Broadway. In addition it may be said that

particular attention should be given to the serpentine which has a tendency to cause the sliding over it of the associated rock material, especially when wet; and also to move itself.

From about Station 26 to Station 28, the proposed highway line traverses a grassy hillside field without rock exposures. It is undoubtedly underlain by rocks of the Franciscan formation which are probably similar to those found in the slopes above Golden Gate avenue (Sta. 23+50 to 26).

The steep hill slope between Stations 29 and 32 is apparently mostly in Franciscan sandstone, which, near the surface, is weathered brown, is moderately soft and easily broken. It is somewhat sheared. It stands at a rather steep slope, and will probably yield a good foundation in the cut. A pit near Station 29 and at the top of the slope, shows the nature of the weathered sandstone. Lower down the slope firmer sandstone is encountered, and the cut will probably expose firmer material than is exposed at the surface.

The fill from Station 32 to Station 35+30 will be built on a natural slope that is underlain chiefly if not wholly by Franciscan sandstone. Near Station 33+50 occurs an exposure of fairly tough hard sandstone. Beyond, it is apparently softer.

The cut from Station 35+30 to Station 43+23 will be chiefly or wholly in Franciscan sandstone. A little beyond Station 41 is a pit which exposes weathered brown sandstone. The actual cut will probably expose firmer rock. Insofar as the road is

located on cut ground it will have a stable and satisfactory rock foundation. In the approach to this cut and to the cut west of Station 31, the natural hill slope is steep, and there will naturally be a tendency for the fill to settle or move down with respect to the bedrock exposed in cut. This is a not unusual condition where an earth fill is placed against a fairly steep slope of solid rock, and yet it is sometimes overlooked in construction.

It looks as if there had been some sliding at the northwest end of the Station 39+41 hill, but no fresh evidence of such action was observed, and it does not look as though it would threaten the stability of the fill.

The rocks become firmer and stronger as one goes southeastward into the ridge that bounds Temescal Creek valley on the southwest, but where the road is to cross appears to be very satisfactory as a bedrock foundation.

Temescal Creek Crossing,
Station 43+23 to Station 53+10.

This part of the valley of Temescal Creek is well recognized as a fault line valley, eroded in the shear zone of the "Hayward" fault. It is evident that the Hayward fault has been in existence for a long period of time, and that during this period the earth's crust has been displaced along the fault many times. The total number of movements and the intervals between these movements cannot be determined even approximately on the basis of our

present knowledge, but the total horizontal displacement, the summation of the small movements that have taken place from time to time, is probably not less than a half a mile. Each of the individual movements of displacement probably gave rise to an earthquake. The last strong earthquake that has been referred to the Hayward fault occurred in 1868. Many small shocks recorded by seismographs, sometimes actually felt by human beings, but giving rise to no damage, have occurred from time to time since that date. The Hayward fault is what is known as an "active" or "live" fault and future movements can be reasonably expected to occur along it, although at present the time of the next strong movement cannot be predicted with any certainty.

If any strong displacement should occur along the Hayward fault in the valley of Temescal Creek, any structure extending across this valley would be subject to two kinds of disturbances: 1) Actual rupture and displacement of the ground along the fault line, and 2) shaking by the resultant earthquake.

1) Throughout the known history of the Hayward fault, the prevailing displacement has been such that the country to the west of the fault has moved in a northerly direction with respect to the country on the east side of the fault. The magnitude of the horizontal displacement at any one time of active movement is not known. It may be recalled that at the time of the strong earthquake in

1906, horizontal displacements along the San Andreas fault, which shows a similar type of movement to that of the Hayward fault, varied along the fault trace from 0 to a maximum of 21 feet.

Observations along the San Andreas fault give us suggestions as to how a movement on the Hayward fault would probably express itself at the surface of the earth. Firstly, although the San Andreas shear zone is sometimes very wide, the movement was not distributed throughout the shear zone, but generally broke cleanly along a definite line that cut the surface sharply as if a furrow had been plowed across a field. Judging from this the break will probably be a sharp one, and the position of the line of rupture within the shear zone—or even outside of it—cannot be predicted. In other words, in case of a movement along the Hayward fault the line of surface rupture, although it is likely to occur within the limits of Temescal valley, may break through any part of the valley cross section. Secondly, the ground to the west of the break will probably move bodily in a northerly direction with respect to the ground to the east of the break. As the observations are purely relative, the actual movement may be southerly on the east side, or both sides may actually move in opposite directions. The practical result is locally the same whatever the distribution of absolute displacement between the two sides may be. At the end of the movement a point on the west side of the break will be distant from an originally adjoining point on the east side

by a number of feet representing the total horizontal displacement—as, for example, in the 1906 movement along the San Andreas fault, the road across the valley of Tomales Bay, from Pt. Reyes Station going to Inverness, suffered a total displacement of 21 feet, the roadbed to the west of the break then lying 21 feet from corresponding parts of the roadbed east of the break and in a northerly direction.

No known human structure can prevent this movement of the earth's crust. The effect on a structure resting on the ground and crossing the line of fracture will depend on the nature of the structure. A strong, strongly held together, unit structure might be warped, rotated, or otherwise disturbed without fracture. A roadbed or masonry wall, will normally be fractured and carried by its foundation, and suffer the same type of displacement and to the same extent as the ground upon which it rests.

An earth-rock embankment, or earth-rock fill such as is intended for the new road, if built with reasonable stability, would probably suffer as little serious damage as any man-made structure. It would certainly suffer displacement corresponding to that of the ground, and any pavement would be broken or shattered along or near the line of displacement. But it should not collapse as a bridge might whose piers were displaced, and it could be repaired at a cost of only a small fraction of the original cost of the valley crossing.

It may be well to call attention to the fact that liability to damage from this cause is not peculiar to the route chosen. Any other route that might be selected, to connect Oakland or Berkeley through the hills with the country to the east would have to cross the Hayward fault.

For completeness sake it may be pointed out that in the geological growth of the Berkeley Hills, displacements with vertical components have been involved. Occasionally these have acted to displace the rocks along the Hayward fault zone although some stretches along that zone show no displacements. Whether these movements have taken place simultaneously with the movements of horizontal displacement along the fault is not known. In any case the actual vertical displacements of a fault-like nature along the Hayward fault zone are in their totality only a small fraction of the horizontal displacements—from 0 to possibly not over 20%. If in the course of a fault movement affecting the valley of Temescal Creek a vertical component is involved, it will probably be of such a nature that the ground west of the break will be depressed with respect to that east of the break (or that east will be elevated with respect to that west). If that should happen it would be necessary to reestablish a grade with regard to the road on the two sides of the break. I believe that it is not likely to be a very serious matter, if it occurs at all.

2) In regard to the shaking movements of an earthquake that may have its origin on the Hay-

ward fault, it may be pointed out that such movement would not be limited to the vicinity of the fault trace, but would extend out in all directions, affecting a surface area the magnitude of which would depend on the severity of the originating shock. At the surface of the earth the destructive effects might not be strongest along the trace of the fault, but at some distance, even miles, away. In planning the road and appurtenant structures, it should be taken for granted that any part or all of them may be subject to strong earthquake shock. In connection with the crossing of the valley of Temescal Creek, it is probable that a good earth-rock fill with stable side slopes, and well drained, would probably not be injured at all by even a severe earth-quake shock.

Temescal Dam

Temescal dam extends across the valley of Temescal Creek a short distance above the proposed new roadway. It is an old structure, probably originally built as a lower dam over 60 years ago, and later raised and broadened. When the first plans were made for the new tunnel road, it appeared that a satisfactory and economical crossing of the valley could be made by using the dam as base for the road fill. The East Bay Municipal Utility District which had recently acquired the dam from the East Bay Water Company was agreeable to the project but could find in the files no record of the mode of construction or history of the old dam, which is said to

have been originally built by the pioneer, Mr. Chabot. It was necessary therefore to put down a series of test holes to determine the composition and condition of the dam.

Altogether, 18 holes are put down, varying from 25½ to 63½ feet in depth. Samples of material were collected and studied in the laboratory and logs prepared for all the wells, in each case showing depths and nature of materials encountered, and in a number of cases the results of mechanical analyses of the samples. A contour map of the dam and its surroundings shows the location of the test holes. The map and test hole logs are attached to the present report as an appendix.

The borings show the dam to be made up largely of hydraulically filled material derived chiefly from the northeast side of the valley; a smaller amount from the southwest side. A series of dikes are recognizable, built up to form basins into which material was sluiced. At intervals in the test holes, clay layers are found that definitely represent the slow settling from the muddy water overlying the directly sluiced-in fills in the basins. These layers of clay interfere with the passage of water vertically within the dam; but when moist they produce roughly horizontal soft plastic layers in the fill.

The lower layers of fill are largely derived from serpentine country while the upper layers are chiefly from the rhyolitic talus and hill waste, so abundant on the upper slopes of the northeast side of the valley.

The rock foundation under the dam is chiefly a more or less sheared serpentine—except along the southwest valley edge where it is schist and sandstone.

Height of Dam. The borings show that the dam is higher than would be judged from surface appearance. None of the wells along the crest of the dam reached the bedrock or recognizable valley floor (depths 62, 50, and 63½ feet respectively). An approximate estimate, based on a conservative slope, carried from holes that did strike bottom, is 80 - 85 feet for height of the fill over the deepest part of the old valley under the crest of dam. The height of the crest above the lowest part of the downstream toe is about 105 feet.

Old Stream Course and the Spillway. The old stream trench was evidently near the southwest edge of the valley, and the filling of this trench, and apparently also the effort to stop percolation through the dam has caused the dam to be extended much farther downstream along the southwest side of the valley, giving an unsymmetrical form to the fill. The spillway was placed on the opposite side of the valley where the valley side slope is more gentle, and bedrock comparatively shallow.

Problems presented by conditions found. If the highway were to cross the dam as originally proposed, the following conditions would be met:

1. Approaching from the east side, a part of the road fill would be on the upstream (reservoir)

side of the dam. If it were thrown directly on the silt accumulation of the reservoir, the latter would probably move and cause the fill to flow or creep out into the reservoir. While no recent test has been made of the character and depth of the silt in the reservoir just above the dam, estimates of probable depth of the original floor indicate that in the deepest part underlying the proposed road fill, the silt is 40 - 50 feet deep. When wet this material might flow its own weight, and tend to fill any deep excavation.

2. The road fill would cross the dam diagonally and on the northeast end it would have been about 25 feet over the dam crest, crossing over to the downstream face at progressively lower elevations. Along the higher part of the dam, it would be unevenly loaded. It is doubtful whether this dam would stand such uneven loading without some movement of deformation. A series of holes put in the central and eastern part of the dam show water in the dam, its upper surface at elevation 389 - 391 under the dam crest, and 382 under the highest berm. This water does not extend uniformly to the base of the dam, but is commonly cut off by a clay layer, giving a zone of water through that part of the dam, 5 to 10 feet thick (at 415 reservoir level) resting on a clay layer base, which is plastic, especially in its upper part. Uneven loading might well cause movement along this wet plastic zone.

If the water were cut off and the clay allowed to become dry I believe it would be firm enough

to hold. The water layer referred to extends well along and through the dam. Expense, and time for cut off drainage and drying would be involved.

3. Farther west the roadway would run over the lower downstream part of the dam, crossing the lowest two berms overlying the old stream trench. This part of the dam was found to contain a considerable thickness of soft wet clay carrying a varying percentage of small rock fragments. The worst condition was shown in hole 8 on the lowest berm (elevation 364.5 feet). The surface was "swampy", water stood in the hole a few inches below the surface, and for 33 feet down from the surface was a body of soft wet clay carrying only 15 - 30% of small rock fragments and sand, and yielding 70 - 85% of clay and mud washings on mechanical analysis. A 50-foot-high road fill was planned to overlie this area. Such a load would probably cause the soft clay to squeeze out, and would give a slippery, soft, foundation for the embankment. The conditions shown in holes E and F on the next higher berm are only a little better. In hole F water was struck at 4½ feet and the material encountered was watersoaked all the way down (46 feet). There is a larger proportion of rock fragments than in hole 8. [87].

Near and just below the "swamp" area toward the southwest valley side, water seeps out and is in part carried away from the fill surface in pipes. It has the appearance of spring water, possibly

coming from the bedrock in the vicinity. With the idea of determining whether this water and the "swamp" water supply was entirely local and not from the reservoir, holes E, F, on the 370 foot berm, C at 382.7 elevation and G on the highest berm (399 feet) were put down. These holes showed that water passes through the whole dam continuously to the "swamp" area. The free water surface in the holes was found, with reservoir water surface at 415 - 420 feet elevation, to be as follows:

	Elevation, top of hole	Water Surface
Hole 7, crest of dam	434.8	391.0
G	399.0	380.0
C	382.7	375.7
E	369.2	368.2
F	370.2	365.7
8 (swampy area)	374.5	364.0

If a fill should be placed along the downstream slope of the dam, as originally proposed, it would be desirable to remove the soft clay and provide drainage for the water coming through the dam, and for any spring water that may reach the surface in the area involved. It is questionable whether it would be safe to remove 33 feet of soft clay unless the reservoir and dam were first freed from most of their water. It might start a movement or sloughing in that part of the dam that overlies the old stream trench.

Conclusion. Surface examination and borings have disclosed conditions that would require special engineering treatment if a high road embankment is to be placed diagonally across Temescal dam. Such treatment on the one hand would incur expense that would offset a considerable amount of straight fill required if the dam is not used, and, on the other hand, would involve risk of seriously damaging the dam structure during construction of the embankment. I therefore advised that the road be routed below and clear of the main body or of the lower berm area of the dam.

Furthermore, I am of the opinion that with a high water surface in the reservoir, and leaving the dam just as it is, if a strong movement should recur on the Hayward fault in such a way as to shear the dam and subject it to the accompanying earthquake shock, or possibly even without the direct shear if a severe earthquake shock the dam, there would be danger of its failure. I would advise, therefore, that you arrange if possible for the maintenance of a water level in the reservoir as low as feasible, and that if the road crosses the valley, below the dam, the highway fill be constructed on the theory that it may possibly be subject to the effects of failure of the dam.

The Railroad Crossing.

On the northeast side of the valley of Temescal Creek the Sacramento Northern Railroad runs parallel to the valley and must be crossed by the new

road. The railroad grade is here in an open cut that lies between stations 50 and 52 and is about 23 feet deep along the center line of the proposed road. Sheared serpentine outcrops on the west side of the cut near the center line of the proposed road grade. To the southeast the cut is in rhyolitic detritus. This rhyolitic material occupies the slope up to and beyond the old tunnel road. Where it is in place, it shows general shearing. But most of the material of the lower slope is slide, talus, and wash from above. About 100 yards northwest of the crossing of the Pacific Gas and Electric Company's road over the railroad, serpentine comes in on the east side of the cut rising to the northwest until it extends upward about 35 feet above the track. It continues along the cut to its northwest end. On the hill slope above the cut a sheared greenstone overlies the serpentine behind a concrete wall, and is overlain in turn by the rhyolitic material, the contact between the latter two dropping down to the southeast, so that only rhyolite is found in the southeast portion of the cut. Several times when examined, water was observed seeping into the cut apparently from both sides, but chiefly from the Northeast side, southeast of the end of the concrete wall. Again on a small flat north of Station 51 water seepage was observed. The railroad engineers must have had some difficulty with sliding or slumping in the cut, and protected it by a concrete wall, by continuous drainage ditches on both

sides of the cut, and a drain to a sewer with a perforated metal plate at surface to take off the water which at times must be much more abundant than when I observed it.

Any plan to make this crossing in the form of a bridge or viaduct supported by piers or columns, would have to be carried out with great care and special precautions in construction and in draining, because of uncertain stability of the ground and the likelihood that the sheared serpentine would not withstand locally applied high stresses. One plan suggested, that of placing the railroad within an artificially constructed concrete "tunnel", on which the highway fill will be placed, the tunnel to be so constructed that the stress will be distributed throughout a monolithic floor, and not locally concentrated, appears to me to be most suitable to the ground conditions. Not only would the problem of satisfactory footings be solved, but the fill would tend strongly to stabilize the sheared and detrital material on the uphill side of the present cut. In any case, I believe it would be well to take appropriate measures to drain off the water that now soaks and softens parts of the ground east of the track.

Toward the creek from the lower end of the railroad cut are evidences of an old landslide. A number of large trees are growing on the slide material, and no noticeable action appears to have taken place since the trees were planted. This action may possibly have taken place at the time of

the 1868 earthquake, 62 years ago, and still show the present tree growth. It may of course have been still earlier. Evidence of similar action on a small scale is found east of the railroad near the road crossing. If a heavy earthquake follows a wet season during which the ground is well soaked it is likely to start slides at a number of localities, as was done by the earthquake of 1906. It is possible that in the future a heavy earthquake under like circumstances might cause slumping or sliding in this vicinity, and also further along up to Station 60, especially if steep-sided cuts are made in the rhyolitic talus and hill waste. Such an event is to be considered as a rare occurrence as it depends on the concurrence of two unrelated factors one of which recurs every few years and the other at much longer intervals. It might result in the slumping, sliding or rolling from the upper slopes, of earth and rock detritus onto the road. The chances are very slight that the roadway itself would be carried away. It may be noted here that along the Contra Costa County extension of the old tunnel road, such occurrences are not infrequent and take place after practically every wet winter without requiring the aid of any earth shock. While such action is possible along this part of the road, it may be expected to be a very rare event.

From Temescal Creek Crossing
to Tunnel Portal.

Between Stations 53+20 and 59+90 a cut is planned. The material along this stretch is rhyo-

litic hill waste and detritus. The excavation is to remove up to forty feet or more of material and may reach rhyolite in place. The bottom of the cut will probably be entirely satisfactory for roadway foundation. The hillside slope of the cut will encroach on the old tunnel road which will have to be set back by means of a lateral cut into the hill, if it is to be retained as a road. If fairly firm rock is not uncovered in the hillside slope of the cut for the new road, this slope may be subject to slumping or sliding after wet seasons.

After a short fill between Stations 59+90 and 60+40 the proposed grade crosses a spur in a cut between Stations 60+40 and 62+50. This spur shows outcrops of rather massive rhyolite and some soil. The rhyolite is somewhat sheared with a certain amount of clay gouge in the fractures. The cut will propably expose rock over much of its course, and should be satisfactory for road foundation.

Between Stations 62+50 and 65+85 the proposed road crosses Temescal Creek on a fill. While on the upstream part of the right bank there is a considerable amount of soil and hill wash, the downstream part exposes rather massive though somewhat sheared rhyolite. Throughout, underlying in part hill wash and a thin covering of stream detritus along the creek-way, in part exposed at the surface, is rather firm rhyolite. The foundation for this fill is entirely satisfactory, probably the best along the whole road.

Between Stations 65+85 and 74+95 is a long cut. The first 70 to 100 feet is in rhyolite as just described and then passes into Chico shales and sandstones. The contact is faulted and shows shearing, but there is no indication that this is an active fault or liable to any further displacements.

The surface depression roughly between Stations 67 and Station 69 is due to general erosion in the Chico shales. These shales by their weathering yield a clayey surface which becomes soft and slick when wet. It is probable that the cut will remove most if not all of such material from the surface except along the deepest part of the depression. This deepest part of the depression naturally carries the bulk of the drainage from the higher slopes. Not much water is involved but in the past it has greatly softened the ground, and given rise to a spring and swampy spots. Care should be taken to handle the water and prevent a slick sliding-surface developing under the fill. The waste from this cut if used for fill on the creekward slope, should be placed where it will cause no trouble from its propensity to soften when water-soaked.

Beyond approximately Station 69 the formation carries considerable sandstone with only subordinate shale, to about Station 70, then more shale to about Station 71, then more sandstone again. This sandstone is light brownish to grayish when fresh, and while usually not a hard rock, should on the deep cut make a good foundation and on moderate slopes

hold up well. There is some shearing in the rock. Most of the better developed fractures and shear planes dip back obliquely into the hill and would cause no practical trouble. Between Stations 74+75 and 76+10 the road grade is to be partly on fill and partly in cut. The formation between Stations 74+75 and 75+55 is chiefly shale, beyond this, to Station 77 is a mixture of sandstone and shale, more or less broken up. With a considerable proportion of sandstone fragments and blocks in association with the shale, the clayey products of the shale weathering will act as a binder and allow satisfactory consolidation of the fill, and will cause no trouble if the clay is not too abundant and, then, not unless it becomes water-soaked. Insofar as the hill slope is steep, any part of the grade which in the same cross section is partly on cut and partly on fill may suffer from a settling or sagging of the fill with respect to the rock in the cut. Where the fill is chiefly sandstone or even sandy detritus from the sandstone, if its base is well founded, such action will not take place. Shale or clayey fill ought not to be based on the steep slope.

A test cut above Station 76+10 shows more shale than sandstone. If this is the prevailing condition in the slope of the road when made, it may be desirable to reduce the slope to a lower angle.

Between Stations 76+10 and 79+70 the roadway is to be placed on a fill across a branch of Temescal Creek. It lies between two spurs of dominantly sandstone formation. The only special point to

which attention may be called is that along the tributary streamway and for some distance up the right bank on the hillside to about Station 78+80 there is a considerable amount of clayey material. Fortunately it is on a rather flat slope, and does not appear to be so located as to be subject to water soaking if covered by a fill.

Between Stations 79+70 and 82+40 the proposed road is again in a cut, the rock is chiefly a moderately firm sandstone with subordinate shale. Conditions in general are satisfactory. Beyond Station 81+50 the road will be partly in cut and partly on fill and the same statement applies as was made for the stretch between Stations 74+75 and 76+10.

A reef of stronger sandstone crosses the creek between Stations 83+50 and 85+10. Although it has suffered shearing, it is excellent foundation for cut or fill.

Between Stations 82+40 and 87+50 the proposed road again crosses Temescal Creek on a fill. Conditions appear to be entirely satisfactory.

The cut from Station 87+50 to Station 89 exposes shale and sandstone badly broken up. It stands well on a steep slope when dry. If strongly water soaked, as after a heavy winter, it would probably show some slumping. The cut is not high, and the effect on the road would not be serious. The present fill taken directly from the cut, shows some settling and development of cracks. It is probable that the clay shale when originally excavated was more or

less wet from the winter rains and shows the result of drying and settling. If thoroughly settled and rolled and protected from water-soaking it should stand satisfactorily.

Between Stations 89+00 and 90+50 a fill is placed across a small natural drainage way. The fill about 30 feet high will probably be made up chiefly of a mixture of sandstone and shale detritus with associated clayey material. Reasonable protection from water soaking will render it entirely satisfactory. The underlying rock is shale.

Between Stations 90+50 and 93+50 is a cut in rather badly broken sandstone and shale. Sandstone is dominant in the central part of the cut, with shale dominant towards the ends. Some fresh, hard, gray rock is found in base of cut. This cut has a higher side slope than the one between Stations 87+50 and 89, but will stand better, because of the sandstone in the higher part of the cut slope.

A fill over a small tributary lies between Stations 93+50 and 95+50. The statement made for fill between Stations 89+00 and 90+50 applies to this fill.

In the cut between Stations 95+50 and 96+75, the central portion is occupied by a hard sandstone reef. Softer sandstone and shale is found towards both ends of the cut. The high slope of cut is satisfactory and stable, and the material excavated makes a firm and stable fill.

Upstream from this cut, sandstone is exposed about Station 97+50 to 98+00, but beyond this the

bedrock appears to be dominantly shale. It is poorly exposed.

A long fill is proposed from Station 96+75 to Station 106+50. It practically occupies the bottom of the creek valley. The grade of the original floor is not high, and the side slopes are moderate. Rock is only occasionally and poorly exposed, and is apparently chiefly Chico shale with subordinate thin sandstone layers. There is a general development of clay especially in the soil. Between Stations 98. and 100. a tributary comes in from the north, and between Stations 103. and 105. is a low sloped country which will normally feed water into the clay and fill in wet seasons. The lowness of this part of the fill and its stable position in the valley bottom, make such conditions of minor importance along the stretch. However reasonable drainage should be provided for.

Proposed Highway Tunnel
West Portal

The material at the portal as indicated in profile is largely stream wash, hill wash, and creep, —soft, weak and pervious to water. In the actual construction much of this will probably be removed entirely by open cut, any that remains will require positive support as it cannot be expected to maintain itself unsupported for any length of time.

The hill slope from the indicated portal up to near the crossing of the present "tunnel road", carries a considerable covering of hill wash and

creep material, largely consisting of a fairly loose sandy soil. Its depth cannot be accurately estimated. At about 950′ elevation it is about 15 feet thick and above this towards the present tunnel road it varies from about 10 to 3 feet in thickness. It erodes out very easily under the action of running water and the road culvert has had its outlet position changed at least twice, apparently due to the deep trenches the water has cut.

Near Station 113, from altitude 860 - 870 is a bench that appears to be a stream terrace the back part of which carries a thick coating of wash and creep material from the hillside above. It all lies above the level of the tunnel roof but would have a tendency to carry water for awhile after rains and feed it down into the tunnel.

Monterey (Sobrante?) Sandstone.

The first bedrock formation encountered is of sandstone and sandy shale, probably of the Monterey Group (Sobrante Sandstone?). The sandstones are light gray when fresh, light ochreous colored when weathered. When fresh they are firm, sometimes hard and resistant, but most of the material slacks on exposure to the atmosphere, oxfoliates and crumbles down. On weathering it assumes a pale yellowish or ochreous color and mostly disintegrates into sand. The sandy shales when fresh are brownish and firm but also slack, exfoliate, and disintegrate on exposure at the surface of the ground. A test tunnel recently run in about 124 feet in the

west portal region exposes the fresh sandstones and sandy shales in the face. If this fresh and relatively unbroken condition continues, the formation will prove satisfactory insofar as sufficient height of such material lies above the tunnel roof to give satisfactory support. Where it is but a thin mass between the tunnel roof and the overlying disintegration products it is desirable to plan for its artificial support or removal even if it stands well on first opening.

Even in the tunnel these rocks will be subject to gradual slackening, although much more slowly than when exposed at the surface of the ground. This should cause but slight difficulty during construction, and when the formation is protected by the finished tunnel lining this action will no longer be effective.

As at the surface of the ground, only the weathering products are to be observed, before actually driving the tunnel through, the condition of this formation along the tunnel line, and depth to the top of the fresh firm rock, can be determined only by test holes or borings. The condition shown in the face of the tunnel are promising of satisfactory conditions beyond.

On the surface the sandstone ends about at the present "tunnel road" which probably means that along the proposed tunnel line it would end about Station 118 or 118+50, 175 feet - 180 feet underground.

For statement of oil and gas possibilities see under Claremont Cherts.

Claremont Cherts.

After leaving the sandstones the prevailing formation for about 1200 - 1300 feet, is the Claremont Chert (called Claremont Shales in the San Francisco Folio of the U. S. Geological Survey). This formation consists chiefly of a series of alternations of layers of chert from 2 –6 inches or more thick, and somewhat thinner layers of siliceous shale. Occasionally a layer of clay shale, sandstone, siliceous ferruginous limestone, or volcanic ash is encountered.

Water. The strata of this formation intersect the ground surface at steeply inclined angles, and they are cut by many small faults, which in many cases also intersect the surface. The cherts are quite brittle, and any fractures or crush zones produced in them by earth movements tend to remain open and allow free movement of water. The combination of these characters generally results in water flowage through many lines in the formation. Previously stored water may be trapped by the tunnel driving. The Claremont tunnel penetrated this formation at a greater depth, and therefore under conditions likely to develop more water than the proposed tunnel. It also encountered it where affected by marked faulting. Nearly 700 gallons a minute were yielded by the cherts when first penetrated,

but this yield has since dropped to less than 50 gallons a minute.

The old inter-county highway tunnel lies entirely in the chert formation, but at a still higher level than the proposed tunnel. I do not know whether it developed much water during construction. It must have yielded some but probably not very much. At present, after rains, there is a certain amount of drip and seepage into the tunnel, and a similar renewal of water flow after rains would undoubtedly take place in the cherts penetrated by the proposed tunnel, even after all storage water had been drained off.

Fortunately none of the rock types found in the Monterey chert formation as developed in this area suffers from contact with water. They all stand as well wet as dry.

Oil and gas. The cherts and most of the shales of the Monterey formation are bituminous, and on being heated to a high temperature yield oil and gas. This property, however, is not likely to cause any trouble in the course of tunnel driving. But in the course of the geological history of these rocks, some oil and gas has been developed and may be encountered in tunneling, where formation is moderately dry.

In the Claremont tunnel, presumably largely due to the very free flow of water through the cherts, but little oil and gas was encountered, and no trouble was experienced from this source. It may be

added that on account of gas troubles in the Chico formation, the tunnel was worked with strict rules about open lights, matches, and smoking, and this may have had something to do with the lack of gas trouble in the cherts. Some of the oil and gas which undoubtedly originated in the Monterey chert formation, was found in the Orinda formation at and not very far from the contact with the cherts. The oil and gas had apparently penetrated the Orinda formation along small faults and fissures. They caused considerable trouble in the eastern part of the Claremont tunnel, where at one time a heavy blast in the face set fire to the oil and gas which in turn ignited the timbers, entailing much delay and expense.

In the San Pablo tunnel, where the body of cherts is more closed in by overlying rocks than in the proposed tunnel, a serious explosion occurred while they were driving through the cherts.

It is possible that some oil or gas or both developed from the cherts, may have found its way into the Monterey (?) sandstones, and it would therefore be a measure of safety to drive the tunnel with suitable precautions, especially as the cherts are approached within a few hundred feet. If light oil is struck in any part of the tunnel it should not be allowed to collect in pools or depressions or stand in drainage ditches as it may gradually develop gas and become liable to ignition or even explosion, setting fire to timbers or causing worse damage. It is impossible to predict the exact location or amount

of such material that may be encountered. It may be little or none, or it may be in troublesome amounts. It should be watched for and given immediate attention if encountered.

Structural Characters. In general the chert belt is rather regular in its structure, the strata dipping high (56° - 80° at the surface) to the southwest.

The southwest 100 feet or more of the chert is the most irregular part of the belt intersected by the proposed tunnel line (about 118+50 to 119+50). It is cut through by a fault of considerable magnitude which is probably a continuation of the Wildcat fault of the San Francisco folio. This fault has caused more or less shearing, and displacement along subsidiary fractures with rotation of minor blocks and crushing in certain zones. To the northeast of Station 120+00, the structure appears to be remarkably regular to the northeast limit of the chert belt, although there are present some minor faults and crushed zones.

The fault zone will be occupied by broken and possibly crushed chert. In the Claremont tunnel, the chief yield of water from the cherts came from this fault zone.

In driving through the cherts, the combination of crushed zones and water often presents difficulties. The crushed rock (with or without water) may flow out into the tunnel almost like quicksand, or, if it holds together better, it may develop considerable pressure, until the water pressure is relieved by free flow into the tunnel. In the Clare-

mont tunnel the careful driving forward of spiling was necessary in the more broken and the crushed portions of the chert. In certain cases where a broken or crushed mass of rock lies within intersecting fault planes, and thereby loses its bond to surrounding rock, it may slump down into the open working, leaving a chamber in the wall or roof. If this is experienced at all in the proposed tunnel it will probably be in the southwestern fault zone mentioned above. If such unsupported blocks or masses are met, it would probably be best to let them down or remove them, before placing the concrete of the completed structure.

Based on experience gained from other tunnels in the cherts, and judging from long exposed steep quarry faces in the same formation, it may be expected that after driving, and after the material in the immediate vicinity of the tunnel has come to equilibrium, the rock will stand well and need no support. The main belt of cherts beyond the fault zone has a particularly favorable structure from this standpoint, and is the strongest and most stable material to be penetrated by the tunnel. Even the part in the fault zone is likely to stand well after the driving through it is completed. This was the experience in the Claremont tunnel.

The Orinda Formation.

From about Station 130 (as judged by surface dip, but it may be farther along in the tunnel as the dip may steepen underground), to the east portal

of the proposed tunnel, the bore will be entirely in the Orinda formation of Pliocene age. This formation consists of a series of alternations of beds of consolidated gravel, clayey sandstone, and sandy clays, which were laid down as fresh water deposits. The beds dip at high angles (55° - 60°) to the southwest. Tunnel driving is generally rapid in the sandstones and clays, somewhat slower in the gravels, which are naturally harder on drill steel. The formation usually breaks rather blocky and often develops a certain amount of overbreak.

Water and its Effects. Water is usually in very slight amount in the Orinda formation, coming in along certain gravels and coarse sands, or seeping along minor faults or shear zones. Most of the formation is likely to be dry. In the tunnels already driven through it, the greater part of the clayey sandstones and clays were dry and dusty.

While these sandstones and clays are naturally mostly dry, they are generally affected by contact with water. In fact they are sensitive to both drying and wetting, and a chunk removed from underground and exposed above ground usually cracks and slacks in the sun, and breaks down into a soft clay or mud in the rain. While the beds are firm, and when dry stand well underground, they carry but little natural cementing material, except in occasional layers. These cemented layers remain firm even on exposure to sun or water.

Where not badly sheared this formation is likely to stand well provided it is protected from water

action and air slacking. In the Lafayette and Claremont Tunnels where water (a comparatively small amount) came down through sheared clays or clayey sands, a locally weak zone was produced that made weight on the timbers, or slowly pushed them in laterally. Such zones required special support. If such zones occur along the proposed tunnel line they are likely to be narrow, and not very serious.

In the flood that occurred in the east portal region of the Claremont tunnel (flood water coming in from San Pablo creek), the water filled the tunnel and stood against walls and roof as well as floor. Portions of the roof slumped down, causing considerable chambers that ran 20 or 30 feet above the tunnel roof line. A number of timbers slipped in laterally, and in places timber sets collapsed before the water was all pumped out. I mention this to illustrate the effect of water lying against an exposed surface of the formation.

Along the proposed tunnel line conditions are very good from this standpoint, as no important source of underground water exists upgrade from the Orinda beds. It should be easy to prevent the water from the cherts working up into the Orinda region. During construction and later, the tunnel bore through the Orinda beds should be protected from possible influx of water from the surface drainage near the junction of the Tunnel Road and the Fish Ranch Road (called on map, Claremont Avenue Extension).

As naturally exposed at the ground surface, the Orinda formation slacks down into soil and gives very few rock exposures. It is also subject to landsliding. Such a slide has taken place just below the chert contact and about 100 feet north of Station 134. Its movement has been northward away from the tunnel line. Another lies 50 - 100 feet south of Station 136 and has moved eastward. These are somewhat off the tunnel line, are superficial and have affected the ground for a depth of but 15 - 30 feet where the tunnel lies 200 or more feet below the surface. Landsliding in this formation does not take place when it is dry and normally occurs following a rainy season, especially one of above the average precipitation. As the slope of the ground is fairly steep near the east portal, and as it may be steepened and otherwise disturbed during tunnel operations, the possibility of the sliding or slumping of this formation in the portal region should be kept in mind and guarded against.

Support. I believe that in general this formation will stand well if reasonable care is taken in handling it, except near the east portal where the overburden is comparatively slight, and the surface influence may have weakened or may in the future weaken the material sufficiently to require artificial support.

Oil and Gas. As noted above, under the Monterey Cherts, it is possible that some showings of oil and gas derived from the cherts may be encountered in driving through the Orinda formation.

Their occurrence in this formation is so irregular that their presence cannot be definitely predicted, but it would be well in driving the tunnel to watch for them and, in case their presence is noted, and they can be easily recognized in this formation, use care in blasting and have no open lights or flames. See further the statement under Monterey Cherts.

Tunnel Earthquake Relations.

As far as we have any definite evidence concerning the faults that cut the proposed tunnel line, their movements were connected with a period of geological activity that is past. There is no field evidence, or evidence from history or from our seismographs that any movements have taken place along these faults in recent times. While the evidence is wholly negative, I believe that it is reasonably safe to assume that no fault will by its movement cut or directly deform any structure that may be placed in the belt under consideration. That future movements will take place farther west near the base of the hills is probable, and it is also likely that the tunnel formations will be shaken by future earthquakes. The rocks should, however, stand satisfactorily even in the face of a severe shaking up by an earthquake, any weak near-surface stretches in the region of the portals possibly excepted.

Tunnel in General.

In a general way the rocks and rock structures that would be encountered in the proposed tunnel

are favorable from the engineering standpoint. The strata mostly dip at high angles and are intersected by the tunnel at a high angle to their trend. Such a condition restricts the widths of belts that may show local weakness or much water, and presents the strongest arrangement of the type of strata involved, and the easiest to deal with in tunneling.

Throughout the main belt of cherts, the rocks may be expected to be entirely self-supporting indefinitely; in the fault belt of cherts and in the Orindan, with proper care in driving and handling, the rocks should stand well and be self-supporting except possibly along certain shear zones which may require local reenforcement to withstand local pressure (not general weight). These statements do not refer to any measures that may appropriately be taken to prevent the detachment or falling of fragments or blocks from the surfaces exposed by the tunnel, but to general support of the mass of rock in the sides and roof of the tunnel.

Near the portals the rocks will probably be found weak and will require positive support to prevent movement or caving.

The question has been raised as to the relative desirability of a single larger tunnel or two smaller ones. The relative advantages in operation of the finished tunnel or tunnels are outside the scope of this report. The geological aspect is related to construction and to the maintenance of the integrity of the finished structure. I do not know of any geological considerations that would indicate that the

smaller tunnels are feasible and a larger one not. It is certain that in cases where support is necessary or resistance to any possible earth pressure must be provided, the forces or stresses involved will be much greater with a larger tunnel and the problem of handling such conditions to that extent more serious. I have at present no reason to say that the larger tunnel would be impossible or that it would constitute a risk that should not be taken.

From the East Portal of Tunnel
to Station 156+50.

From the east portal of the proposed tunnel to the end of the surveyed line Station 156+50, the formations involved are the Orinda, as described in the section on the tunnel, with comparatively thin layers of alluvium along and near the creek lines, and soil and hill waste on the slopes. The plan for the highway is shown on a blueprint of Joint Highway District No. 13 entitled Right of Way thru Apartment Estates Club of America Incorporated Property, and dated Sept. 1931.

From Station 140+50 to about Station 147 the roadway will be sunk into the ground, in part covered over (Station 140+50 and Station 142+19), in part open above (Sta. 142+19 to Sta. 147). The upper part of the cut will be in hill waste, soil and alluvium, the lower, at least along some of the distance, in the Orinda formation. No special problem arises as the result of the geological conditions. Any covering will have to be supported, and the side walls will have to receive such thrust as is occa-

sioned by the seasonal wetting of the clayey ground. Only comparatively small stresses are involved.

From Station 147 to Station 156+50 the road is to be largely on fill with short stretches of cut on right or left. If the fill material is taken from the tunnel it will contain a considerable amount of clay in its make-up, becoming quite soft when water-soaked. As the fill will be in the bottom of the valley it cannot be subject to any important sliding, and as its side slopes are at a maximum only 10 or 12 feet high no serious slumping is to be expected.

The cuts made into the hillside affect but a small distance along the road: The Claremont Avenue Extension southeast lane between Stations 144+00 and 148+50, and the main road from Stations 154+00 to Stations 156+50. Insofar as these slopes may be in clay, they may slump onto the road after a wet winter, but they are not high and the effects will probably not be serious. Between Stations 149+50 and 154+00 the old tunnel road grade protects the new road from any slumping from the hillside on the east side. The only place where some recent slide movement was noted is between Stations 149+50 and 151+50 along this east side stretch.

Respectfully submitted,

(Signed) GEORGE D. LOUDERBACK,
Consulting Geologist.

[Endorsement]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Pltff's Ex. No. 22. Filed April 13, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

PLAINTIFF'S EXHIBIT NO. 62

February 9th, 1935.

Mr. Wallace B. Boggs, District Engineer,
Joint Highway District No. 13
1448 Webster Street,
Oakland, Calif.

Dear Sir:

Inclosed find prints giving general idea of the method we propose using in concreting tunnels,

Very truly yours,
SIX COMPANIES OF
CALIFORNIA.

By T. M. PRICE,
Project Manager.

TMP:k
Copy RB

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. *Deft's* Ex. No. 62. Filed April 29, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

PLAINTIFF'S EXHIBIT NO. 92

INDUSTRIAL ACCIDENT COMMISSION

State Building
San Francisco
April 16, 1936

Six Companies of California,
1522 Latham Square Bldg.,
Oakland, California

Gentlemen:

You are hereby advised that the order of this Commission covering the Broadway Low Level Tunnels, dated February 29, 1936, is hereby rescinded, if the following conditions are complied with:

1. Driving may be continued in the upgrade tunnel beyond the junction of the wall plate drifts to the East portal and driving may be resumed in the downgrade tunnel beyond the caved-in portion to the East portal, if a method is followed as presented by your drawing No. 119, dated April 10, 1936, which consists in general of installing 8 x 10 timber spreaders in each timber set and extending across the tunnel approximately 19 and 27 feet respectively above the finished floor of the tunnel; further by continuing to use excavation equipment which may be operated beneath the lower spreader without interfering with it.

The top spreader is to be installed immediately after the completion of the segment set. The lower spreader is to be installed immediately after the core is excavated sufficiently to allow this spreader to be installed. Two longitudinal timbers, 2 x 12", are to be spiked to the top of each lower spreader to prevent bowing.

Two sets of hangers, two to each set, are to be provided for both the bottom and top spreaders all as per detailed drawing No. 119.

2. A wall plate system for driving the tunnel will be permitted provided 12 x 12 plumb posts are installed under each segment set, tightly wedged in place. Batter posts may be used provided in plumb posts are installed immediately after excavation is done for such posts. The batter shall not exceed 6 to 15 from the vertical.

Dowels shall be installed in each A segment and wall plate. (The dowel system will be accepted in lieu of placing the spreader at the wall plate joint.)

The plates shall be blocked behind each segment set and shall set on a firm and even bearing.

Provision must be made against undermining the wall plates by the Bagley system of excavation, and also against overshooting the side walls directly under the wall plates.

3. In addition to the Fire Bosses keeping the record of overbreaks as outlined under the Commission's order of March 16, 1936, the Fire Bosses shall check the segment sets daily to determine if the

wall plates have settled, thereby loosening the wedging and packing of the segments.

The contractor shall also make a daily check of the segment sets to determine if the wedging and packing is tight.

If the segments are found to have become loose rewedging shall be done.

4. The core of the tunnel section shall continue to be sloped sufficiently to provide safety against caving ground to the workmen drilling lifters or similar holes.

Very truly yours,

(Signed) T. A. REARDON
Commissioner

(Signed) FRANK J. BURKE
Deputy Commissioner.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Plff's Ex. No. 92. Filed May 5, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk. [160]

DEFENDANT'S EXHIBIT A

IV. (b)

(3) Construction Cost, Subdivided into Principal Structures or Classes of Work, and Showing (i) Labor and (ii) Material Cost for Each Subdivision:

ESTIMATE

Item	Quantity	Labor (i)	Materials (ii)	Other Items	Total
1. Grading	763,000 cu. yds.	$ 53,424.00	$ 22,423.50	$153,052.50	$ 228,900.00
2. Overhaul	8,100,000 sta. yds.	11,340.00	8,250.00	20,910.00	40,500.00
3. Structural Excavation	44,000 cu. yds.	60,500.00	198.00	5,302.00	66,000.00
4. Shoulders	362.000 sq. ft.	2,534.00	3,630.00	1,076.00	7,240.00
5. Reinforcing Steel	4,420,000 lbs.	55,252.50	114,920.00	28,727.50	198,900.00
6. Structural Steel	445,000 lbs.	4,005.00	12,549.00	5,696.00	22,250.00
7-8. Concrete	15,350 cu. yds.	38,377.50	97,040.90	91,631.60	227,050.00
9-10. Concrete pavement	68,100 sq. ft.	2,625.00	8,605.27	115.73	11,346.00
11. Asphalt Surface	44,000 sq. ft.	88.00	3,146.85	285.15	3,520.00
12. Oil Macadam	724,000 sq. ft.	3,864.00	72,561.35	10,454.65	86,880.00
13-14-15-16. Curb	3,716 lin. ft.)				
Gutter	4,300 sq. ft.)	277.50	1,234.80	1,887.70	3,400.00
17. Cement Sidewalks	21,000 sq. ft.	525.00	1,597.05	1,237.95	3,360.00
18. Fill Protectors	15 each	30.00	104.86	15.14	150.00
19-29 incl. Pipe Culvert	9,340 lin. ft.	1,309.00	15,522.75	6,220.00	23,051.75
30-39 " Manholes, etc.	48 each	1,536.00	420.00	684.00	2,640.00

Joint Highway District No. 13

321

DEFENDANT'S EXHIBIT A (Continued)

Item	Quantity	Labor (i)	Materials (ii)	Other Items	Total
40. Underdrains	4,100 lin. ft.	56.00	3,075.00	1,994.00	5,125.00
41. Piping, 6 inch Cast Iron	2,020 lin. ft.	272.00	1,360.26	2,407.74	4,040.00
42. Guard Rail	12,400 lin. ft.	3,968.00	2,976.00	1,116.00	8,060.00
43. Pipe Hand Rail	640 lin. ft.	90.00	528.00	662.00	1,280.00
44. Rip Rap	220 cu. yds.	308.00	—	1,892.00	2,200.00
45. Metal Cribbing	46,000 lbs.	276.00	4,600.00	874.00	5,750.00
46. Gravel Foundation	330 cu. yds.	102.00	716.10	831.90	1,650.00
47-48. Tunnel	5,820 lin. ft.	1,319,290.00)			(2,010,800.00
49. Cross Adits	322 lin. ft.	5,131.00)	444,327.35	250,101.65	(8,050.00
50. Ventilation Buildings	Lump sum	120,772.50	105,799.60	34,427.90	261,000.00
51. Ventilation Equipment	Lump sum	12,000.00	80,000.00	16,350.00	108,350.00
52. Mechanical Equipment	Lump sum	12,000.00	20,000.00	2,000.00	34,000.00
53-54. Electrical Equipment and Carbon Monoxide Detectors & Recorders	Lump sum	41,000.00	140,000.00	21,620.00	202,620.00
Administration, Engineering & Inspection		173,922.69			173,922.69
		$1,924,875.69	1,165,586.64	661,573.11	3,752,035.44

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. A. Filed April 13, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT D

PRELIMINARY REPORT ON THE GEOLOGY OF THE CLAREMONT TUNNEL

Introduction

The following report has been designed with a view towards forecasting in so far as possible the nature of the rocks and rock conditions which will be encountered in driving the Claremont Tunnel. Scientific details are largely omitted except where they have a direct bearing on the engineering problems involved. Special emphasis is placed on the nature, hardness, and "standing ability" of the rocks which will be encountered; on the thickness of the various types of rocks along the line of the tunnel; on the location of faults of consequence; and on the possibility of encountering water and gas.

The data presented herein is based on field work carried out by the writer during April, 1926. Field observations were accurately tied to the survey following the surface line of the tunnel. Such errors as enter the work therefor, are due to observation and interpretation rather than to inaccurate location. Needless to say, imperfect surface exposures of the rocks make certain errors inevitable. Limits of error will, where possible, be indicated at appropriate places in the following description.

GEOLOGY OF THE CLAREMONT TUNNEL Sta. 0 to 66.

Thickness 6600 feet. Orindan formation. Composed predominantly of loosely cemented gravels and sandstones, and some shales. These rocks are part of the same group as now exposed in the west heading (first 1100 feet) of the Lafayette tunnel, and may reasonably be expected to show the same characteristics. The relative abundance of gravels, sandstones and shales will approximate the proportions of these rocks shown in the Lafayette tunnel, though a slight increase in the proportion of gravels may be expected to the westward.

These rocks should break and muck easily. Occasional slabs will break along the bedding planes, but with reasonable care such oversize breakage should be occasional only.

For the first 1000 feet the rocks may be expected to be rather badly broken due to the thin back, the cover being in general less than 100 feet through this distance, averaging about 50 feet. PROBABLY MORE OR LESS TIMBER WILL BE REQUIRED HERE. Beyond Sta. 10, however, and especially beyond Sta. 19, the back rapidly thickens, so that the solidity of the rocks and HENCE THEIR STANDING ABILITY SHOULD CONSEQUENTLY INCREASE.

No great quantity of water should be encountered between Sta. 0 and 66, though some seepages will undoubtedly be met with.

Minor faults may occur within this zone but should cause no difficulties. No surface evidence exists to suggest the presence of any pronounced faults cutting this part of the tunnel, except possibly in the vicinity of Sta. 23. Due to a thick cover of brush and poor exposures, the surface evidence at this place is not conclusive.

The Orindan formation is folded into an anticline (arch), the crest of which occurs between Sta. 42 and 50. (See section.) Due to variable thickness of the formation, the base of the Orindan cannot be definitely determined here, so that a possibility exists for encountering older underlying rocks between the above mentioned stations. The nature of these cannot be forecast. The writer is of the opinion however that the base of the Orindan will not be penetrated, the tunnel remaining entirely within that formation.

The location of the western limit of the Orindan (Sta. 66) is probably accurate within plus or minus 100 feet.

Sta. 66 to 88+50.

Thickness 2250 feet. Composed predominantly of lava flows with some interbedded fragmental volcanic material (tuffs and agglomerates) and gravels. (For details see section.)

The lavas (chiefly andesites) consist of rocks which are both hard and tough. Most of the rocks between Sta. 66 and 88 will be of this nature. THESE ROCKS WILL PROBABLY STAND

WITH A MINIMUM OF SUPPORT, BUT DUE TO JOINTING MAY TEND TO BREAK BLOCKY.

Intercolated with the lavas, a certain amount of interbedded fragmental material may occur. The position of such layers cannot be accurately predicted. Such material, if encountered, may be only slightly softer than the lavas themselves, due to the contained lava fragments.

A gravel horizon occurs interbedded with the lava flows. The gravels are entirely similar to the gravels present in the Orindan formation. Approximately 200 feet of gravels should be encountered (about Sta. 68 to 70) after the first 200 feet of lavas have been passed through from the east. The thickness of gravels encountered may be modified by faulting. The same gravel horizon, probably not over 100 feet thick, should again be encountered about 150 feet from the western edge of the lavas (Sta. 86 to 87). Since the gravels wedge out westward, the thickness here cannot be determined exactly.

A major fault cuts the line of the tunnel and should be encountered at about Sta. 68. This fault cannot be located on the surface closer than about 200 feet; nor can its dip be accurately determined, other than that it is steep to the east. In consequence the indicated intersection with the tunnel may be in error by several hundred feet. The intersection was obtained using a strike of N. 12 E., and a dip of 80 degrees east for the fault.

Abundant water may be expected from the lavas between Sta. 66 and 88. This question will be discussed later under the heading "Water Problems".

The western limit of the lavas, Sta. 88 plus 50, is located with a probable accuracy of about 100 feet.

Sta. 88+50 to 108.

Thickness 1950 feet. Orindan formation. The same group of rocks as occur between Sta. 0 and 66. THE CONDITIONS HERE SHOULD BE QUITE SIMILAR EXCEPT THAT THE ROCKS ARE PROBABLY MORE PREDOMINANTLY LOOSELY CEMENTED GRAVELS. LITTLE TIMBER SHOULD BE REQUIRED SINCE THE ROCKS SHOULD STAND WELL. No great amount of water should occur.

Sta. 108-118.

Thickness 1000 feet Claremont cherts. Consist of thin layers (one to three inches) of hard but brittle cherts, interbedded with thin (¼ to ½ inches) layers of shale. A few beds of sandstone and extremely hard tough limestone occur; thickness one to three feet.

The cherts will be hard on drill steel, but due to their brittleness should break well. THEY SHOULD STAND WELL AND REQUIRE LITTLE TIMBER. Since the beds stand practically vertical no trouble from slabbing should occur.

The cherts are bounded on the west (Sta. 108) by a major fault line. The fault is located with a probable accuracy of 50 feet.

Sta. 118 to 171+50.

Thickness 5350 feet. Chico sandstone. Comparatively soft compact massive sandstone, with only occasional thin beds of shale and gravelly sand. These sandstones should drill, break and muck easily. They should contain comparatively little water, though occasional seepages may occur. Where dry these rocks should stand well and require little support. Due to the massive nature of the beds, slabbing should be infrequent. Altogether this group of rocks would seem ideal for tunneling purposes.

The western boundary of the Chico sandstones is a prominent vertical fault. Under ordinary conditions this fault could be accurately located on the surface. Unfortunately the surface here is a closely built up section of Claremont, and in consequence of the houses, gardens, and other surface improvements, the position of the fault may be in error by as much as 200 feet.

Sta. 171+50 to 180+60 (Portal).

Thickness 910 feet. Largely if not entirely silica-carbonate rock. This rock when fresh is of moderate hardness, BREAKS WELL AND STANDS WELL. Near the surface, however, IT WEATHERS EASILY AND MAY BE MORE OR LESS SOFTENED, DECOMPOSED AND BROKEN UP.

Silica-carbonate rock is well exposed between Sta. 181 and 184, but no exposures occur between Sta. 171+50 and 181, due to surface improvements, houses, gardens, etc. Silica carbonate rock may occur through this interval, or its place may be taken by Franciscan sandstone, a moderately hard, tough rock where solid and fresh, but inclined to be rather highly sheared and fractured near the surface. TIMBERING WILL PROBABLY BE REQUIRED THROUGH PART OF THIS DISTANCE SINCE THE BACK IS NOT GREAT.

Gas Problems.

Through two portions of the tunnel all precautions should be taken to guard against gas.

Sta. 108 to 118.

The Claremont cherts between these stations belongs to the formation which is the source of much of the oil in California. The cherts of this belt, even on the surface, have an appreciable bituminous odor. While the structure here is not favorable for the accumulation of great quantities of gas, it is practically certain that some gas will be encountered.

It will be recalled that the explosion which occurred in the San Pablo-Wildcat tunnel of the East Bay Water Company a few years back resulted from gas derived from this same group of rocks, and under very similar structural conditions.

Sta. 42 to 50.

The rocks which may be reasonably expected here, the Orindan formation, are not in themselves a source of gas. But the structure of these rocks between the stations indicated is favorable for the accumulation of gas in quantity. The tunnel certainly passes close to the base of the Orindan, if it does not actually penetrate it. The rocks beneath the Orindan (nature not determinate but possibly the Claremont cherts) may be looked upon as a potential source of gas. If conditions are such that gas does occur as high up as the tunnel, it might well occur in quantity, while the occurrence of gas here is purely a hypothetical condition, it is a possibility which should certainly be guarded against.

Water Problems

Sta. 66 to 88+50.

Water in quantity need not be expected except between Sta. 66 and 88. The lavas, the predominant rocks between these stations, are prone to be traversed by numerous fractures, the result of folding and also shrinkage on cooling. The rocks therefore tend to contain numerous open waterways. The interbedded fragmental volcanic material likewise tends to be porous.

The structure between Sta. 66 and 88, that of a syncline or basin, is decidedly favorable for the accumulation of water, diverting all the surface drainage of the area underlain by the lavas towards the trough of the fold.

It may be pointed out that the wells of the East Bay Water Company in upper Wildcat Canyon, and also the numerous springs which occur on the east slope of the range (Sta. 50 to 60) derive their water from these lavas. The flow of water from the lavas which may be expected in the tunnel may be expected to have some effect on the ultimate producing capacity of these springs and wells.

Water derived from these lavas in the tunnel may be expected to be quite free from surface pollution, and might well be added to the water supply of the Utility District.

Faults

Three important faults will be intersected by the tunnel.

The tunnel will cut Pinole fault at Sta. 68 (possible error of location 200 feet). The movement on this fault, which dips steeply to the east, has been such that the east side has moved up and south with respect to the west side.

The tunnel will cut the Wildcat fault, which again appears to dip steeply to the east, at about Sta. 108. This location is probably accurate to 50 feet. The east side of the fault appears to be the downthrown side. The horizontal component of motion is not known.

The tunnel will cut an un-named, approximately vertical fault at about Sta. 171+50. The possible error of location of this fault may be as much as 200 feet. The direction of movement on this fault is not certain, but is probably up on the east side.

Summary of Geology of Claremont Tunnel.

Sta.	Thickness	Remarks
0 – 66	6600	Gravels, sandstones and shales similar to those in the west heading of the Lafayette tunnel. Orindan formation.
66 – 88+50	2250	Predominantly lavas with some interbedded fragmental volcanic materials and gravels.
68	—	Pinole fault. Location may be in error by 200 feet.
88+50 – 108	1950	Gravels, Orindan formation.
108 – 118	1000	Claremont cherts.
118	—	Wildcat fault.
118 – 171+50	5350	Chico standstone.
171+50	—	Fault; location may be in error by 200 feet.
171+50 – 180+60	900	Silica-carbonate rock; possibly some Franciscan sandstone.

Respectfully submitted,

(Signed) CHARLTON D HULIN.

University of California,

Berkeley, Calif.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. No. D. Filed April 20, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT E

Oakland, Cal.
Feb. 26, 1929

Prof. Geo. D. Louderbach,
University of California,
Berkeley, Cal.

My dear Professor—In the following summary of conditions and methods used in meeting them, in the excavation of the Claremont tunnel, I have endeavored to give Station numbers where I had such in my possession; otherwise set numbers.

It has appeared to me to be better for me to follow the order of progress rather than that of stationing, although that involves working against the station numbering.

We encountered a small amount of water after penetrating about twenty feet from the west portal, but the ground was firm enough to avoid spile driving or breast boarding.

At approximately one hundred feet in, as I now recall it, we encountered the formation noted in Mr. Hulins report as silica-carbonate rock. This was blocky, overbreaking in many cases, considerable.

At a distance in of approximately seven hundred feet, sand and well rounded gravel, the latter of a probable maximum dimension of approximately three inches, was encountered, carrying some water—probably about forty gallons per minute. No shooting was done in this formation, which ex-

tended for approximately one hundred sixty-five feet. There was some clay in the sand and gravel content; but the standing condition was favored by an overlying strata of almost pure clay that almost followed to line of top of cap.

When we passed thru this, we encountered about twenty feet of a rather easy breaking reddish rock that required light blasting, but offered no unusual difficulties.

The contact beyond this formation was a sort of "gumbo" that mined easily and stood well for a short period, when swelling began and it was necessary to relieve pressures wherever possible to, prevent breaking of the timber. In some cases this corrective was not sufficient, and retimbering had to be done intermittantly for about eighty or a hundred feet. This heavy, constant pressure gradually lessened as we proceeded with our excavation up to station 164 plus 00.

At that point we encountered better standing ground, that offered no unusual difficulties. Slight quantities of water was encountered at intervals up to about station 160, where the shale began to show the presence of gas in small quantities. The gas increased slightly as we proceeded forward, being most noticeable where the shale formation was broken with soft sandstone carrying a small quantity of water.

The shale worked easily and stood well for a short period, giving us time to erect six foot sets after mucking out, the spiling was placed immediately after shooting.

At set 636 a run of small particles of comparatively clean sandstone, forced out by a quantity of water sufficient to flood the tunnel to a depth of a foot for a distance of several hundred feet occurred at the end of the spiling just as preparations were being made to erect the set. About three hours thereafter there was a gas explosion that injured a number of workmen. It appears that the gas ignited as it was entering the tunnel, because the flame concentrated about the point from which the run came, and appeared to have pressure behind it.

From that point forward gas and water appeared together when the disintegrated sandstone was encountered, tho in lesser quantities.

A year or so after having passed thru this formation weight began to show in the vicinity of sets 330 to 345, and 562 to 586, 619 to 634, 816 to 823, 984 to 1002. Relieving sets were erected to hold the ground.

At station 123 plus 31 to 121 plus 91, from whence we merged from the Chico standstone section as noted by Mr. Hulin, to the Chert, concrete invert and arch were poured to take care of a ground swell and consequent weight, and to act as a deterrant to a spread of fire if oil were encountered in the cherts.

We had made it a plan to stop excavation and pour invert whenever water of sufficient quantity was encountered to make track maintainance and train operation difficult. As a consequence the invert was concreted to station 121 plus 91 when we attacked the main body of chert.

When excavation was resumed at the last named station we began to feel pressure on our right. We had proceeded about twenty-four feet when the pressure became so great that relieving sets were erected to support regular four foot sets. Suddenly water broke out alongside in a quantity of probable two hundred gallons per minute, and the pressure was relieved.

At set 1039 we encountered a large flow in a badly broken chert formation. For a few hours our pumps, having a rated capacity of eight hundred gallons could not handle it. This reduced in quantity to five hundred eighty gallons within seven hours, when the reduction apparently ceased. It was necessary to drive spiling and erect breast boards from this set 1052, when the chert showed a tendency to stiffen.

Blasting was permissible then to set 1054 when we again encountered water and badly broken chert, forcing us to again resort to spile driving and breast boarding. At set 1064 we again reached former ground which permitted blasting until set 1065 was reached when a further addition of water and bad ground forced spile driving again. At set 1069 we appeared to have found better going, tho we had later on to erect spiling before blasting the lower part of the face. This condition prevailed until the point of set 1085 was reached.

From there on until the chert was passed the ground progressively stiffened, and some heavy blasting was necessary to break the vertical chert.

Timbering was spaced up to a distance of twelve feet between sets where ground was standing well. At sets 1136 to 1139 we later had to erect two relieving sets.

Generally speaking this vertical chert did not take weight after we passed thru it.

Very little oil was found in the chert, and such as was observed was more apparent in the slippery sand following the water, which generally showed in the broken formation as we approached nearer the firmer cherts.

Leaving the chert we entered the Orindan, which was very firm and hard to break, as was the cemented gravels that frequently appeared. These materials gradually grew softer as we left the chert behind and approached the lava. Most of the oil and oil gas we encountered was found on the contact of the orindan with the cemented gravel. As we approached nearer the lava the gas decreased and the gravel increased, with water dripping in increasing amount. The orindan section, generally stood well under six foot timber spacing, but broke blocky, and did not muck well. One mucker man expressed it that it was like mucking wool.

When it was apparent we were approaching near to the lavas and water began to show evidence of decided increase, we discontinued excavation long enough to bring our concrete invert to the then face.

On resuming mining, our second shot brought us into the lava. The contact was reasonable soft, but the ground stiffened to such an extent that we found

it advisable to discontinue the use of jack-hammers and proceed with leyners. The ground drilled well and broke well and, tho containing some water, gave promise of continuing leyner ground. At station about 89 plus 00 one of the shots in the right breast penetrated a volcanic ash deposit lying in a sufficiently loose state with a large amount of water, that within three hours the face had broken in against our efforts to hold it and the ash accompanied with a flow of fourteen hundred gallons of water per minute partly filled the tunnel for a distance of sixty feet before a sufficient bulkhead to hold it could be erected. The pressure exerted longitudinally forced collar braces from one and one half inches to complete penetration of some of the eight by twelve timbers. The ash surrounded the sets so that none of them were completely knocked down.

We dropped back to Station 94 plus naught eight to 94 plus forty-eight where we had encountered very heavy swelling ground and had found full circle sets at two foot spacing, constantly relieved, not holding the ground, and concreted this section while awaiting stability of the volcanic ash section, and hoping, in the meantime, that water pressure would reduce. The quantity dropped to nine hundred gallons, and it appeared that it might be cut off from the main tunnel by a short drift to our right, which then appeared the direction of the supply. This drift materially relieved the pressure at the face for a few feet and allowed us to excavate the ash to our former face without much difficulty.

However, when we erected our breast boards and began to press forward we found the main water supply was coming from a point forward, and apparently in the line of bore. As we drove our spiling, each one a couple of inches, until a penetration of six to eight feet was accomplished, we attempted to open a small hole in the breast board at the last set and advance a new one four feet ahead. This often took hours, as the runs of fine ash with an ever increasing quantity of water made it almost impossible to make the slightest opening in our former breast boarding. We gradually advanced a small board on the end of a stull to a point four feet distant. This was our most difficult feat, and the new breast board, however small, would aid in stiffening the new face. The next board, also advanced at the end of stull was then placed, after many attempts, each stull being nailed to the cap of the last set. When two feet of new breast was well boarded, the new breast boards were put in at an elevation lower than the old breast board four feet back so that the fine material could not flow out during the placing of the new board. During all of this time we had run after run of fine material, that it took all our efforts to check—tho the total losses were never enough to cause much of a void overhead, or permit a sudden drop of material. When the new breast board was completed two feet down, one or the other of us would creep over the old breast board and place the next lower new board. This sometimes resulted in hasty retreats and near strangulation as

the runs and water attempted to engulf its intended victim; and on at least one occasion emergency pull by the remainder of the men present saved burial.

After getting thru this ash deposit, holes were made in the overhead spiling, sufficiently large to loosen and cause to run such overlying fine material as was necessary to bring large boulders that showed evidence of being there, down on the top of the spiling to forestall a possible future run and drop of material that might cause a collapse of the timbering and resultant trapping and drowning of the crew. These boulders now rest on the timbering and act as a reinforcement against a drop of others.

We encountered an ever increasing quantity of water until three thousand nine hundred twenty gallons per minute were measured on the wier. As we proceeded we encountered new flows, and the area left behind, gradually and fairly rapidly, decreased.

Spile driving and breast boarding were again necessary in broken formations carrying large quantities of water at sets 1612 to set 1606, Stations 82+92 to 82+82, 82+06 to 81+75, 80+14 to 79+84, 78+06 to 77+79, 76+28 to 76+01, 74+98 to 74+55, 75+52 to 75+27, 73+25 to 72+74, tho at no other point than the one in vicinity of Station 89+00 did we have runs that we found it difficult to control.

In some of the latter breast board places we could advance our spiling with coal picks and moils, and breast board as we pulled the muck away from the face. At other times we could breast board half way down the face and lightly shoot the toe to make mucking easier.

In cases where we found enough clay present, the star steel was difficult to free, we found augers worked better. Track laying under twelve to eighteen inches of water, we found difficult, and all timber and lagging and collar braces had to be "tied down" to prevent them from floating away and derailing trains. Wedges were a constant menace, as their size made them hard to hold and easy to float.

When we re-entered the orindan, we found it reasonably soft and blocky. Very little water and no gas penetrated it.

Very respectfully yours,

L. M. LARSON.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Six Companies vs. J. H. Dist. No. 13 etc. Deft's Ex. E. Filed April 20, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT N

(Received August 11, 1934 Joint Highway Dist No. 13.)

Builders of Low Level Broadway Tunnel

SIX COMPANIES OF CALIFORNIA

Field Office Post Office Box 120
Berkeley, California

August 9, 1934

File: Construction
Time Schedule

Mr. Wallace B. Boggs, District Engineer,
Joint Highway District No. 13,
1448 Webster Street,
Oakland, California.

Dear Sir:

In regard to your recent verbal request for revised construction schedule.

Attached hereto please find chart indicating our tentative time schedule covering the various sections of the work as indicated.

Trusting that this will meet your wishes, I remain,

Very truly yours,

SIX COMPANIES OF CALIFORNIA,

By (Signed) W. R. FONTAINE.

WRF/rww
Att. sch.
CC to: Mr. A. J. Orselli
Mr. J. F. Barber

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. N. Filed April 22, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT O

(Received Feb. 13, 1935 Joint Highway Dist. No. 13.)

Builders of Low Level Broadway Tunnel

SIX COMPANIES OF CALIFORNIA

Field Office Post Office Box 120

Berkeley, California

February 12th, 1935

Mr. Wallace B. Boggs, District Engineer
Joint Highway District No. 13
1448 Webster Street
Oakland, Calif.

Dear Sir:

Referring to your letter of February 5th, 1935, we are inclosing revised construction schedule.

Very truly yours,
SIX COMPANIES OF
CALIFORNIA,
By (Signed) T. M. PRICE,
Project Manager.

TMP:k

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. O. Filed April 22, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT S

(Received Sept. 29, 1934 Joint Highway Dist. No. 13.)

Builders of Low Level Broadway Tunnel

SIX COMPANIES OF CALIFORNIA

Field Office Post Office Box 120

Berkeley, California

September 28, 1934

Re. Broadway Tunnel
Tunnel Construction
Joint Highway District No. 13
1448 Webster Street
Oakland, California.

Gentlemen:

We enclose herewith one blue print of our Drawing T 15 titled Tunnel Construction and one blue print of Pacific Coast Steel Corporation Drawing T 2 A titled Proposed Location of Splices in Re-Inforcing Steel.

We attach hereto a schedule of a proposed sequence of operations for approximately the first 100 feet for each tunnel.

These enclosures and the attachment are submitted for your consideration and criticism.

We would appreciate an early appointment with you at some time to suit your convenience so that we can discuss the whole problem with you.

Yours very truly,
SIX COMPANIES OF
CALIFORNIA
By (Signed) T. M. PRICE.
ARM-K

BROADWAY TUNNEL

Sequence of Operations for First 100'
Consider Down Grade Tunnel.

Operation 1 Drive—Timber—Lag—Drifts 1 and 2—First Level.

Operation 2 Drive—Timber—Lag—Drifts 1 and 2—Second Level.

Operation 3 Drive—Timber—Lag—Drifts 1 and 2—Third Level.

Operation 4 Drive—Timber—Lag—Drifts 1 and 2—Fourth Level.

Operation 5 Drive—Timber—Lag—Drifts 1 and 2—Fifth Level.

Operation 6 Drive—Timber—Lag—Drifts 1 and 2—Sixth Level.

Operation 7 Drive—Timber—Lag—Top Drift.

Operation 8 Set Posts P—at a predetermined location, to clear the formwork and concrete to be installed.

Operation 9 Set Studs Q—which will be sawed to detail and shapes, to receive wood form sheathing.

Operation 10 Build ood form sheathing R—to the line of the concrete.

Operation 11 Pour concrete S—to the height of the ledge (indicated by construction joint).

Operation 12 Set Posts P 1-P 2-P 3-P 4—to which will be attached studding Q 1-Q-2-Q 3-Q-4—sawed to detail and shapes to receive wood form sheathing.

Operation 13 Cut Caps T-T 1-T 2-T 3—at points indicated on our Drawing #T-15, and so as to clear the formwork. Remove Posts P 5-P 6-P-7-P-8. Place temporary stulls U—if and where required by ground conditions.

Operation 14 Place Wall Plate V.

Operation 15 Place laminated centering W with its necessary support.

Operation 16 Build wood form sheathing R 1 to the line of the concrete for the complete tunneling.

Operation 17 Pour concrete to the required heights and thicknesses, removing any temporary stulls as the pouring of concrete progresses.

Drawing illustrates:

Operations 1 to 7—on the left hand side of the tunnel section.

Operations 8 to 17—on the right hand side of the tunnel section.

Operations in Upgrade tunnel, similar to those shown on the drawing for the Downgrade tunnel.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex S. Filed April 26, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT AA

December 27, 1934

Six Companies of California
155 Sansome Street
San Francisco, California

Gentlemen:

The Government Engineer (Bureau of Public Roads of the United States Department of Agriculture acting by and through C. H. Sweetser, District Engineer, District No. 2) has authorized this District to waive the provisions of subsection (b) of section 1 of paragraph 20 of your contract dated June 4, 1934 with Joint Highway District No. 13 of the State of California to permit you to employ men on tunnel work not to exceed forty (40) hours in any one week, nor more than eight (8) hours in any one day. This waiver is based upon the application filed by you with this District on December 6, 1934 which was transmitted to the Government Engineer in accordance with the resolution of the Board of Directors of this District adopted December 6, 1934.

Joint Highway District No. 13 of the State of California, in accordance with the terms and conditions embodied in said contract and in accordance with the letter of C. H. Sweetser, Esq., District Engineer of District No. 2, said Bureau of Public Roads, dated December 19, 1934, a copy of which is annexed hereto, marked Exhibit "A", made a part hereof and incorporated herein as fully as though set forth herein at length, hereby authorizes and

permits you to employ men on the tunnel work to be performed under said contract not to exceed forty (40) hours in any one week, nor more than eight (8) hours in any one day, and upon all of the conditions and limitations and under the regulations set forth and detailed in said Exhibit "A".

JOINT HIGHWAY DISTRICT No. 13 OF THE STATE OF CALIFORNIA,

[Corp't Seal] By THOMAS E. CALDECOTT, President.

By HARRY M. STOW, Secretary.

Exhibit "A"

United States Department of Agriculture
Bureau of Public Roads
District No. 2

December 19, 1934.

Mr. Wallace B. Boggs,
District Engineer,
Joint Highway District #13
1448 Webster Street,
Oakland, California.

Dear Sir:

On December 10, 1934 I received from the Secretary of Joint Highway District No. 13 of the State of California a letter dated December 8 enclosing four certified copies of the application of Six Com-

panies of California, a corporation, the contractor now constructing the project of Joint Highway District No. 13 of the State of California, known as the "Broadway Low Level Tunnel", for a waiver of the provisions of Subsection (b) of Section 1 of Paragraph 20 of the contract to permit said contractor to employ men in the tunnel work not exceeding 48 hours per week, together with four certified copies of the resolution of the Board of Directors directing that said application be submitted to the United States Bureau of Public Roads, the Government Engineer under the terms of said contract, for such action as the Government Engineer may consider proper. The Secretary requested me to advise you of my action in respect to said application.

After considering the application of Six Companies of California; the order of T. A. Reardon, Director of the Department of Industrial Relations of California, permitting Six Companies to employ men on tunnel work on the construction of the Broadway Low Level Tunnel not to exceed 48 hours in each week; and letter from R. C. Stillwell, Veterans' Representative, State of California, dated December 10, acting for Mr. John A. Stellern, State Director of the National Reemployment Service, State of California, copy of which is enclosed; Mr. Stellern's letter dated December 15, concurring in Mr. Stillwell's letter, copy enclosed; and after further investigation by the Bureau of Public Roads it is in my judgment not practicable nor feasible, particularly considering safety of workmen, to proceed

with the tunnel work on a thirty (30) hour per week basis. Under no circumstances, however, can forty-eight (48) hours per week be granted, but you are authorized to waive the provisions of Subsection (b) of Section (1) of Paragraph 20 of the contract dated June 4, 1934 between Joint Highway [206] District No. 13 of the State of California and Six Companies of California, contractor, and permit the contractor to employ men on tunnel work not to exceed forty (40) hours in any one week, nor more than eight (8) hours in any one day.

If satisfactory as to details the following classification of men performing work in the tunnel as submitted in the application of Six Companies of California, should be adopted and these men should be carried on a separate payroll:

Tunnel Shifters
Tunnel Miners
Tunnel Timbermen
Tunnel Shovel Operators
Tunnel Locomotive Operators
Tunnel Hoist Men
Tunnel Powdermen
Tunnel Brakemen
Tunnel Chuck Tender
Tunnel Mechanics
Tunnel Laborers
Tunnel Muckers
Tunnel Vibrators
Tunnel Tampers

Tunnel Form Men
Tunnel Concrete Men
Tunnel Concrete Finishers
Tunnel Cement Gun Operators
Tunnel Pump Men
Tunnel Concrete Laborers
Tunnel Drill Operators
Tunnel Electrical Workers
Tunnel Labor—Unskilled
Tunnel Plumbers
Tunnel Portable Hoist Engineers
Tunnel Power Shovel Operators
Tunnel Track Men

Yours very truly,
C. H. SWEETSER,
District Engineer.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. AA. Filed April 26, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT BB

Builders of Low Level Broadway Tunnel
SIX COMPANIES OF CALIFORNIA
Field Office Post Office Box 120
Berkeley, California

December 26, 1934

(Received Dec. 27, 1934 Joint Highway Dist. No. 13.)

Mr. Wallace B. Boggs,
District Engineer,
Joint Highway District No. 13,
1448 Webster St.,
Oakland, California.

Dear Sir:

We send you herewith three drawings which illustrate the methods we are now using in the tunnel excavation.

Drawing No. 1 illustrates the method now used in the south tunnel. According to the plan, an excavation or drift 7 ft. wide at the bottom is started at foundation level on each side of the tunnel. This is gradually carried up by means of working platforms to the crown. Muck is worked down to the bottom and is removed by a scraper operated by a hoist. When the excavation has progressed sufficiently the posts and wall plates are put in position, and then the arch segments.

Drawings Nos. 2 and 4 indicate the method in the north tunnel. This is practically a heading and bench method, but the heading is carried out in an annular shape. At the sides the bench level is at the bottom of the wall plate, which rests on the ground and which is placed as soon as the drift is deep enough. A top heading is carried on simultaneously with the wall plate drift and then the earth between is excavated. Segmental arch sets are placed on the wall plates. The muck is shoveled or wheeled and allowed to fall over the sloping face of the bench.

After segmental arches are in, the core is to be excavated by means of the shovel, the face being on a slope for greater stability. When the toe of the face slope is about three feet from the position of the next post, a place for same will be hand excavated and the post set under the wall plate.

In the south tunnel the slope of the face of the core will follow the rake of the most inclined post, and the core will be removed by the shovel.

As to the engineering work required so that we may be able to carry out the above methods: It is proposed to use a chord length of 25 feet in each tunnel and the following work would be required:

South Tunnel:

Establish center line and an offset line on each side 12′ 6″ from the center line. These lines to be established so that they can be projected forward into the excavation.

For grade, elevations giving the grade of tunnel should be established as follows: a grade 2′ 6″ above the subgrade or foundation grade of side walls; a grade 2′ 0″ above bottom of wall plate at its lower inner edge; and a grade 2′ 0″ above inner face of concrete lining at crown.

North Tunnel:

The work here is similar to that in the south tunnel. The center line of tunnel and offset lines 11′ 0″ on each side of center line will be required for alignment. For grades, the requirements will be as follows: a grade 2′ 6″ above bottom of foundations of side walls; a grade 2′ 0″ above bottom of wall plate; and a grade 2′ 0″ above top of footing block of top heading, this grade being 9 inches below the inner face of concrete lining at the crown. Grades should be so given that they can be projected with straight edges.

Both the system of excavation and the engineering involved are necessarily subject to change as the ground changes.

Your very truly,

SIX COMPANIES OF CALIFORNIA

By (Signed) T. M. PRICE,

Project Manager.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. BB. Filed April 26, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT II

(Received April 3, 1935 Joint Highway Dist. No. 13.)

Builders of Low Level Broadway Tunnel

SIX COMPANIES OF CALIFORNIA

Field Office Post Office Box 120

Berkeley, California

April 2nd, 1935

Mr. Wallace B. Boggs, District Engineer,
Joint Highway District No. 13
1448 Webster Street
Oakland, Calif.

Dear Sir:

We are inclosing a print of our drawing No. 19, which shows the arrangement we have adopted for placing concrete in the tunnel lining. We think that this drawing is self-explanatory, but some explanation may be necessary.

When we discussed this matter in your office some time ago, we contemplated the use of 36 foot forms. We have now decided on a length of 27 feet.

While the drawing is schematic, it is intended to fairly represent the method and forms. The forms will be supported by jacks from the form carrier. In order to move the forms, the sides will be swung in and the entire form lowered.

Concrete will be brought from the central mixing plant to a double concrete pump, mounted on a car

as indicated. Moto mixers, operated only when dumping, will be used to transport the concrete. Each side of the concrete pump will be independently operated, so that concreting could be carried on in case of a break-down of one pump.

For the side walls, the concrete will be discharged through two pipes serving both sides of the form. It will be conducted by fixed spouts through openings in the forms, into final position. Short spouts, at the openings, will provide for inspection and working of the concrete if that should be necessary. It will not be necessary to move the pump outfit while pouring the side walls.

It is contemplated to pour the arch ring in the usual manner, by moving back the pipes and car as the filling advances.

Very truly yours,

SIX COMPANIES OF CALIFORNIA

By (Signed) T. M. PRICE,

Project Manager.

TMP:k

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. II. Filed April 26, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT BBB

Builders of Low Level Broadway Tunnel
SIX COMPANIES OF CALIFORNIA
Field Office Post Office Box 120
Berkeley, California

Sept. 17, 1935

Received Sept. 18, 1935 (W. B. B.).
Mr. Wallace B. Boggs,
District Engineer,
Joint Highway District No. 13,
1448 Webster St., Oakland

Dear Sir:

Now that we have a complete survey of the condition of the tunnel timbers, we find that in a good many places it will be necessary to trim as much as six inches to obtain the required thickness of our concrete lining. In order to make the job as safe as possible, we propose to Gunite a reinforced concrete ring as shown on the enclosed sketch, supporting it where practical against rock at intervals, to give the timber the necessary stability so that trimming can be carried out just ahead of the concrete. In most places, this ring can be kept back of the neat concrete lines, but there are places where it will be necessary to let the Gunite ring encroach into the concrete a maximum of four inches. Inasmuch as the Gunite rings are a permanent material and will bond well with the concrete lining, it might be well to place some of the permanent steel in these

rings while they are being built. The encroachment into the concrete will be left rough and cleaned.

The reason for the four-inch encroachment is because it is our opinion that anything in the way of a Gunite ring less than ten inches would be of no value.

It is only proposed to use the above plan where the maximum trimming is six inches or less to get the required thickness of concrete.

We propose to try out this method, and if it proves satisfactory to everybody concerned, we will continue its use where practical and necessary, but if we find after a fair trial that it is not giving the results we hoped for, it will be discontinued.

In cases where it is necessary to trim more than six inches, it will be necessary to use some other method, which is being worked out at the present time.

We would be pleased to have your approval of this plan.

Yours very truly,
SIX COMPANIES OF
CALIFORNIA
By (Signed) T. M. PRICE,
Project Manager.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. BBB. Filed April 27, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT KKK

Builders of Low Level Broadway Tunnel
SIX COMPANIES OF CALIFORNIA
155 Sansome Street
San Francisco, Calif.

October 8, 1935

Mr. Wallace B. Boggs, District Engineer,
Joint Highway District No. 13 of the State of California,
1448 Webster Street,
Oakland, California.

Dear Sir:

You are hereby requested to grant permission for the undersigned Contractor to install the permanent reinforced concrete tunnel lining in all portions of the tunnel bores which have been excavated but were not lined, on September 30, 1935, with the permanent tunnel lining called for in the plans and specifications, to a section with an intrados crown position 10 inches lower than the crown position called for in the plans and specifications and with the position of the interior walls of the sides of the tunnel lining a maximum of 6 inches inside of the position provided for in the plans and specifications, and to all of the dimensions shown on Sheet 187 S of the plans, entitled: "Main Tunnel Special Section Type A Date September 28, 1935 Joint Highway District No. 13 State of California", a copy of which is attached hereto, the Contractor to install proper tran-

sitions in the special sections of the permanent lining to the sections of the permanent lining built in accordance with the original design and to make such alterations in the location of the ceilings, flues, hangers and other details of the completed structure as are determined to be necessary by the District Engineer of the Joint Highway District No. 13 to adjust the same to the special section, all without additional cost to the District for additional labor or material required to change the form and position of the section as requested.

Yours very truly,

SIX COMPANIES OF CALIFORNIA

(Signed) By S. D. BECHTEL

President

HARTFORD ACCIDENT AND INDEMNITY COMPANY, a Connecticut Corporation,

[Seal] (Signed) By A. C. POSEY,

Attorney-in-fact

FIDELITY AND DEPOSIT COMPANY OF MARYLAND, a Maryland Corporation,

[Seal] (Signed) By GUY LeROY STEVICK,

Atty-in-fact, Agent

Attest:

D. MORTON

THE AETNA CASUALTY AND SURETY COMPANY, a Connecticut Corporation,

[Seal] (Signed) By J. C. SWEARINGEN

Attest:

R. M. SZYMANSKI

INDEMNITY INSURANCE COMPANY OF NORTH AMERICA, a Pennsylvania Corporation,

[Seal] (Signed) By HARRY C. MILLER,
Attorney-in-fact

AMERICAN SURETY COMPANY OF NEW YORK, a New York Corporation,

[Seal] (Signed) By R. D. WELDON,
Resident Vice President,

L. V. PLATT,
Res. Ass't Sec'ty

FIREMAN'S FUND INDEMNITY COMPANY, a California Corporation,

[Seal] (Signed) By JAMES J. CRISP,
Atty-in-fact

MARYLAND CASUALTY COMPANY, a Maryland Corporation,

[Seal] (Signed) By W. F. KELSO,
Attorney-in-fact,

UNITED STATES
FIDELITY AND
GUARANTY COMPANY,
a Maryland Corporation,
[Seal] (Signed) By EDW. W. COPELAND,
Attorney-in-fact

THE FIDELITY AND
CASUALTY COMPANY
OF NEW YORK, a
New York Corporation,
[Seal] (Signed) By L. F. CALLAHAN,
Attorney

GLENS FALLS
INDEMNITY COMPANY,
a New York Corporation,
[Seal] (Signed) By R. LYNN COLOMB,
Attorney

STANDARD SURETY AND
CASUALTY COMPANY
OF NEW YORK, a
New York Corporation,
[Seal] (Signed) By A. C. POSEY,
Attorney-in-fact

STANDARD ACCIDENT
INSURANCE COMPANY,
a Michigan Corporation,
[Seal] (Signed) By A. A. KAUFMAN,
Attorney-in-fact

PACIFIC INDEMNITY
COMPANY, a California
Corporation,
[Seal] (Signed) By EARL A. DAVIS,
Attorney-in-fact

MASSACHUSETTS BONDING AND INSURANCE
COMPANY, a Massachusetts Corporation,
[Seal] (Signed) By J. R. McKINNEY,
Attorney-in-fact

CONTINENTAL
CASUALTY COMPANY,
an Indiana Corporation,
[Seal] (Signed) By B. F. CATOR

NEW AMSTERDAM
CASUALTY COMPANY,
a New York Corporation,
[Seal] (Signed) By WALTER W. DERR,
Agent and Attorney-in-Fact

Sureties

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. No. KKK. Filed April 27, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT UUU

Before the Industrial Accident Commission of the State of California

I hereby certify that the foregoing, consisting of twenty-eight pages, is a true and correct copy of the testimony taken at the hearing before the Industrial Accident Commission on September 24, 1935, at 2 p. m., at the offices of the Commission, State Building, San Francisco, California, said testimony being with reference to the "Broadway Tunnel."

(Signed) FLORENCE H. JONES,
[Seal] Hearing Reporter.

Dated at San Francisco, California this 6th day of April, 1938.

Attest:
(Signed) FRANK J. BURKE,
Secretary Industrial Accident Commission
of the State of California.

HEARING

Before the Industrial Accident Commission of the State of California

September 24, 1935—2 P. M.

State Building, San Francisco

Present:

T. A. Reardon, Chairman
Frank C. MacDonald, Commissioner, I. A. C.
Frank J. Burke, Secretary, I. A. C.

F. L. Lowell, Industrial Accident Commission
L. K. Reinhardt, Industrial Accident Commission
J. I. Ballard, Editor, Western Const. News, S. F.
Jack Norton, Tribune, Oakland
O. W. Peterson, Six Companies of California
Thos. Soule, Chief Engineer, Industrial Ind. Exchange
S. M. Jarrett, Safety Engineer, Ind. Ind. Exchange
J. O. Barlow, Utah Construction Co.
V. G. Hindmarsh, Six Companies
T. M. Price, Six Companies
George D. Whittle, U. S. Bur. Public Roads
B. Modglin, 200 Financial Center Bldg., S. F.
S. D. Bechtel, President, Six Companies
T. L. Phillips, Engineer, Western Pacific R. R.
D. Young, MacDonald & Kahn
Mason D. Pratt, Engr. Sureties
Max Thelen, Atty. for Six Companies
DeLancy Smith, Atty. for Six Companies
A. B. Tinning, Atty. for Highway Dist. No. 13
Mr. Boggs, Engineer, Highway Dist. No. 13

Mr. Reardon: Gentlemen, the reason we called this hearing is with reference to the tunnel known as the "Broadway Tunnel." There has been an accident over there, an unfortunate accident, and our only duty with reference to that tunnel is the safety.

We have nothing to do with how the tunnel is designed—right or wrong—but the safety of the men working there is what we are interested in. We have Mr. Reinhardt here, who is an engineer of this Commission, and he has filed a report with the Secretary, Mr. Burke, which I will ask that Mr. Burke please read.

Mr. Burke: This is an inter-communication from the Department of Safety, dated San Francisco, September 19, 1935, addressed to the attention of Mr. Reardon, Director, Department of Industrial Relations, subject:

"Broadway Tunnel."

"As per your telegram of September 17th, I made an inspection and survey of the Broadway Tunnel this date and found the following conditions:

"There is approximately 1800 feet of full section tunnel which is timbered and I would estimate that 75 percent of this timbering has to be removed and set back in order to clear the forms on Design A, the original design, before concreting can be done.

"The investigation of the cave-in on August 28th, in which three men lost their lives was the result of moving back one of these timber sets. As far as my investigation could determine this work was being done in a careful manner according to standard practices and the cave-in therefore was not the fault of the mechanical operation, but due to a peculiar formation in

the earth above the tunnel section, which possibly permitted a crust to form with a void back of the crust, allowing a major slide to occur once it started, thereby breaking two or more sets of timbering.

"My opinion is that in disturbing the present timbers we are inviting a similar cave-in in one or more places of the 1800 feet of timbered section.

"On September 2nd, Mr. Fry advised the Six Companies that he had been in consultation with the consulting engineers, Messrs. Tibbitts and Phillips, and agreed with their recommendation that the timbers should not be disturbed, that the forms should be lowered to clear the encroachment on the tunnel section by the shifted timbering. Mr. Fry's letter recommended that this be done.

"I understand consulting engineers Lippincott and Van Norman also recommended the lowering of the form and not disturbing the present timbered sections.

"Up to Saturday, September the 14th, it was tentatively agreed by the Six Companies, the Joint Highway District and P. W. A. that the forms would be lowered 8" and the timbers not disturbed, but this agreement was cancelled due to some legal objections on the part of the Joint Highway District and the scheme was called off. The Joint Highway District then notified the Six Companies that they were to

abide with paragraph E, Section 32, page 60, which states in part 'timbers found to project within the concrete lines shall be removed and reset before concreting.'

"At the time of my inspection this work was getting under way. As I considered it a serious hazard to disturb the timbers, I urgently recommend that the Commission issue a Special Order requiring both the Joint Highway District and the Six Companies not to remove and reset the timbering but to either lower the forms or submit to this department some other plan for approval whereby the timbering will not be disturbed."

Mr. MacDonald: Gentlemen, I have just started a paper along the line, which I ask that you sign, so that we may know who is present today.

May I suggest that the law of the State of California, that is, the Workmen's Compensation, Insurance and Safety Laws, prescribe in part, Section 34:

"Sec. 34. Every employer shall furnish employment which shall be safe for employees therein and shall furnish a place of employment which shall be safe for employees therein, and shall furnish and use such safety devices and safeguards, and shall adopt and use such practices, means, methods, operations and processes as are reasonably adequate to render such employment and place of employment safe, and

shall do every other thing reasonably necessary to protect the life and safety of such employees."

Section 35 continues:

"No employer shall require, permit or suffer any employee to go or be in any employment or place of employment which is not safe, and no such employer shall fail to furnish, provide and use safety devices and safeguards, or fail to adopt and use methods and processes reasonably adequate to render such employment and place of employment safe, and no such employer shall fail or neglect to do every other thing reasonably necessary to protect the life and safety of such employees, and no such employer shall occupy or maint in any place of employment that is not safe.'

The Industrial Accident Commissioners recognize the fact that largely due to the formation in which the tunnel is being driven, we have a very hazardous undertaking. The timber is now holding the ground, but there has been a shifting of the ground, and, basing our opinion and judgment upon the reports of our investigators, we are very fearful that moving any of the timbers, prior to putting reinforced concrete in, may cause, and, we fear, will cause the loss of additional lives. Now, it is in our province or duty to tell contractors just how they shall do the work. The laws impose the responsibility of safe employment upon the contractor. We have heard conflicting reports and stories concerning methods of operation. We are satisfied that it is the earnest

desire of all parties concerned to have the work done under safe conditions. We have issued an order which has interfered with the continued progress of the work directing all timbering in both the north and south tunnels shall not be removed and reset before concreting; and (2) The concrete forms may be lowered sufficiently to clear encroachments in the tunnel section, or some other plan, whereby the timbering will not be disturbed, may be submitted to the Commission for approval.

It is our desire now to ascertain what determination, if any has been made as to further procedure of the work, that is going to be safe for the lives and limbs of the workers therein.

Mr. A. B. Tinning: I am the attorney for the Highway District. May I say that you have expressed the opinion of the Board of Directors respecting the desire of having all possible precaution respecting risk, taken. However, we are very anxious that in this order a valid order be made by the Commission, in which it has jurisdiction, and we communicated with you on September 20th, asking that a formal hearing be held, because, as we understand our provisions of the Workmen's Compensation Act, it is necessary before a special safety order is made, that a hearing be held, and I assume that it will be satisfactory to use as evidence at this hearing, Mr. Reinhardt's report, as a basis for the finding that operation as conducted, in the opinion of the Commission, is not safe, and if that is done and is stipulated to by the attorneys for the contractor, we are ready to offer the recommenda-

tion as a plan for our side of the matter.

Mr. Thelen: I am one of the atorneys for the Six Companies, and will be very glad to stipulate according to Mr. Tinning's suggestion.

Mr. Tinning: Mr. Boggs, I think you have prepared a tentative plan?

Mr. Boggs: I have—I am District Engineer.

Mr. Tinning: I will say, Gentlemen of the Commission, that this plan is a development of various discussions at previous times, and the result of close work done since this order was issued on September 19th. It is entitled: "Preliminary—Joint Highway District No. 13, State of California, Alameda County, Contra Costa County—Modification, Type A Section," and I would like to have Mr. Boggs, for the purpose of the record, read a statement which has been prepared, respecting this plan and the manner in which it is offered, as a proposal.

Mr. Boggs (reading):

"The recommendation for a modification of the plan for the Broadway Low Level Tunnel which follows, is made solely because of the delay of the Contractor in placing the permanent reinforced concrete tunnel lining in the portions of the tunnel bores which have been excavated——

Mr. Tinning (interrupting): Excuse me. I should state in making this statement, we do not want to be put in the position that our silence may not be construed as an omission. We want to just

state our position in connection with offering this plan—but we waive no rights.

Mr. Reardon: Mr. Tinning, we always carry our meetings on as an open forum, so that any one who has ideas on safety—we will allow them to speak on that subject.

Mr. Tinning: Thank you.

Mr. Boggs (reading):

> "The recommendation for a modification of the plan for the Broadway Low Level Tunnel which follows, is made solely because of the delay of the contractor in placing the permanent reinforced concrete tunnel lining in the portions of the tunnel bores which have been excavated, but not lined with the permanent lining called for in the plans and specifications."

Mr. Thelen (Interrupting): Reference is made to the delay of the contractor. We do not concede that there has been any unreasonable delay of the contractor. It seems to me that the only thing the Commission is interested in, is the safety and what shall be done to make safe conditions.

Mr. Reardon: This is an open forum. You people realize I was President of the Board of Public Works, and I carried on the work of public works in the same manner, as I am now, with the assistance of Commissioner MacDonald, and I will allow Mr. Tinning to submit his evidence.

Mr. Tinning: I am not asking that anything be conceded. We only want our definite statement as to our position, as an excess of precaution. We

waive nothing in connection with this plan. We are simply trying to state our position, not trying to put it to the side.

Mr. Thelen: I may suggest that if references of that kind are made, we may have to introduce evidence tc show that the references are not justified. We do not admit there has been any delay.

Mr. MacDonald: I hardly think we will rule on the statement, but we will recognize and are compelled to recognize Mr. Thelen's right to file with this Commission any supplemental statement he may desire, setting forth the position of his clients.

Mr. Thelen: I think that is very very fair.

Mr. Boggs (Continuing reading):

"These open sections of the tunnel bores are supported by temporary timber supports which have been generally intruded into the space necessary for placing the permanent tunnel lining in accordance with the Plans and Specifications. If the permanent lining had been installed promptly after excavation the present condition of the timbers would not exist.

"To eliminate so far as practical the demonstrated hazard to the lives and safety of workmen arising from resetting the temporary timber supports, and, at the same time to provide a structure equal in strength and capacity to the original design, a modified design is recommended. In making this recommendation, or in its later authorization, it is not intended in any respect to admit the modification is made

because of any demand, claim, or contention of the Contractor which has heretofore been communicated to the Joint Highway District No. 13 of the State of California, or to any of its officers or employees, and the District if the modification is authorized, waives none of its rights under the contract dated June 4th, 1934, with the Six Companies of California.

"The District Engineer recommends as a design for the permanent reinforced concrete tunnel lining for those portions of both bores of the Broadway Lower Level Tunnel, which are now excavated and supported by temporary support, and in which the permanent tunnel lining has not yet been placed, a section with an intrados crown position 10 inches lower than the present designed crown position, the position of the sides of the tunnel lining 6 inches inside of the present designed position, and to all of the dimensions shown on the preliminary plat of Joint Highway District No. 13 of the State of California, entitled, 'Modification Type A Section—Sept. 21, 1935.'

"This recommendation is that said modification in dimensions of the permanent reinforced concrete tunnel lining be authorized by the District, under all of the terms of the Contract, plans and specifications, for the sections of tunnels now open and unlined, the Contractor to be paid therefor at the price per lineal foot as provided in the contract of June 4, 1934 (extra

concrete necessary to fill the space left by the contraction of the dimensions of the tunnel lining, to be furnished by the Contractor at its own cost), all reinforcing steel required in the construction of the modified section to be paid for by the District at the unit price provided in the contract of June 4, 1934; the proposed modification of the tunnel lining will not apply to the portions of the tunnel bores which are already lined, nor to any portions which are not now fully excavated and supported by temporary timbering supports; and the Contractor will be required to excavate, and to install the permanent reinforced concrete tunnel lining in all parts of the bores not yet fully excavated, to the dimensions specified in the original plans and specifications, and to install proper transitions from the modified sections to the sections of lining built to the original design, and to make such alteration in location of the ceilings, flues, hangers and other details of the complete structure are determined necessary by the District Engineer to adjust such portions to the modified sections, all without any extra charge to the District, and at the prices provided in the contract of June 4, 1934.

"Before the above recommendation is finally approved by the Board of Directors of the Joint Highway District No 13, it is subject to the approval by the Director of the Department of Public Works of the State of California, and

the proper officials of the Bureau of Public Roads, and/or the P. W. A. of the United States, after which the Board of Directors of the Joint Highway No. 13, will act upon the recommendation for the modification."

Mr. Reardon: I realize that all of that has no bearing on the case—only the recommendations for safety. You have data in there that affects the construction of the tunnel, and we are not interested in the price of the tunnel, or the change of the plans—our only interest is for safety. If you have such recommendation for the safety of the men working in the tunnel, the Chairman will entertain that. You are protecting yourselves, protecting a price or an agreement which will be made between you. You can take the parts out which are for the recommendation of safety, and the Chairman will entertain any part of that.

Mr. Tinning: We shall be very glad to have the Commission take any part it may desire, but we will not waive any rights. We are not submitting it as evidence. We are submitting it as an offer or a plan which is for the purpose of affording safety, and those provisions are not intended to change the force of the contract, but they are placed there so we will not change our position. That is the only purpose. We do not ask the Commission to take any action on that—but we do not wish to waive our rights. We have this plan which we are ready to offer, and it is offered with the direct understanding that we do

not expect the contractor to change his position and we will not change ours.

Mr. MacDonald: This Commission issued an order practically prohibiting the moving of timbering until such time as the concrete is in place. We also went beyond our real rights, as far as the contractor is concerned by stipulating that concrete forms may be lowered sufficiently to clear encroachments in the tunnel section, or some other plan whereby the timbering will not be disturbed, may be submitted to the Commission for approval. We can only pass on that, as Commissioner Reardon has pointed out, with one thought in mind—safety.

The drawing you submit and the statement you have just read is submitted for the purpose of giving assurance to the Commission that so far as the District is concerned, you are willing to accept a modification of the original plan to the one herein indicated, but you are serving public notice at the same time that you relinquish none of the legal matters in the District made between the District and the contractors, and, in the latter matter, we have no authority to pass any opinion or judgment. It would be void—it would be of no force and effect, but we have the right to insist upon safety. We appreciate the spirit in which the District is acting in the matter for the protection of human life. I can see no reason, Mr. Chairman, why the entire statement cannot be incorporated in the record, subject to the conditions you have stated, and assurance of this given to Mr. Thelen, that the legal

rights of his clients can be safeguarded to any extent that he feels they should be safeguarded, by a supplemental statement that can be filed with the Commission, and made of record.

Mr. Thelen: That is agreeable; but unless we are driven to it we will not file a supplemental statement. We feel that there is much in that statement that is not material here. We think there is a good deal that is immaterial, and the Commission has not jurisdiction. The arrangements between the District and contractors we are not interested in—we are only interested in the safety features. In that statement reference is made to the situation shown on the blue print—that goes directly to the safety. As I understand it, it is intended to lower the crown some 10 inches, to be filled in with concrete, and over here (referring to blueprint) on each side the concrete is to be poured some six inches or so beyond the original plans and specifications, for the purpose of strengthening the structure, and making it unnecessary to remove timbers, and that is the thing for which the Commission is driving.

Mr. Tinning: There is no change made for the purpose of strengthening the structure. The purpose is to prevent the necessity of having to reset or trim timbers, and we do not for one moment concede that the structure is any respect strengthened by that proposal.

Mr. Reardon: Mr. Reinhardt, you have heard the reading of that communication?

Mr. Reinhardt: Yes.

Mr. Thelen: We are trying to avoid a controversy, and the necessity of filing a supplemental statement—if it may be understood that we do not agree with some of those statements—I think we will avoid the filing of the supplemental statement.

Mr. Tinning: That is stipulated, as far as the Highway District is concerned.

Mr. Boggs: That stipulation will be to what effect?

Mr. Thelen: To the effect that we do not agree with those portions of the statement which has been read which do not relate directly to the safety matter.

Mr. Reardon: The Chairman rules on that point—there is lots in that statement that does not relate to safety.

Mr. MacDonald: In order that we may understand Mr. Thelen—your clients, the Six Companies, are agreeable to proceeding with the work in conformity with the modified design herein indicated in conducting the work—that is, placing the concrete in before they attempt to remove timber, in order to insure safety?

Mr. Thelen: I would like to have our engineer, Mr. Peterson, answer that question directly—if he will.

Mr. O. W. Peterson (Engineer for the Six Companies): This plan will eliminate almost in its entirety, the necessity of moving timbers. It will be necessary still to move a very limited number of timbers, and it is planned in doing that to build

up the very substantial framework called a square-set, in the place of those timbers—and I think that work can be done under the supervision of one of your safety engineers. The safety of the District requires a certain minimum thickness of concrete to get the proper theoretical section of the tunnel, and it is not possible to entirely avoid the necessity of some of that work. I would say that that special amount of timber work should and can be done under the supervision of the engineer of the State Commission.

Mr. Thelen: Based on the statement of Mr. Peterson, that answers my question directly—that we are willing to proceed under an order to be made by this Commission, and under order of the District.

Mr. Tinning: I think, Gentlemen, that if we consider the legal situation, believe that it is necessary to have another order, because I do not think the order of September 19th—there might be some question about it, unless there had been a hearing preceding this.

Mr. Thelen: The Company accepted the order in the spirit in which it was made, and we are continuing to obey it until it is changed, and we are not raising the point no notice was given.

Mr. MacDonald: Mr. Boggs, do you feel that the order as of the date of September 19th is sufficient, or was it simply the legality of the order that you had in mind? Did you feel that the order should be amplified?

Mr. Boggs: The order as it exists here would not fully cover the conditions as set forth, and in that it states that all timbering shall not be removed, and follows in paragraph 2 "whereby the timbering will not be disturbed,"—as Mr. Peterson stated, there will be some sections where it will be necessary, under this modified plan, to alter the timbering.

Mr. MacDonald: If the order were modified to read: "All timbering in both the north and south tunnels shall not be removed and reset before concreting, except in such cases where square-sets are substituted for present timbering, and that the timbering thereafter be removed."

Mr. Boggs: I believe that would clarify it.

Mr. Tinning: As I understand the matter at the present time, there will be a certain amount of timber which will have to be trimmed or reset, but it would not be so removed—it would be only the square-sets that would be removed. The vertical segment and arch would stand.

Mr. Peterson: I think the word "reset" is what the discussion really pertains to.

Mr. Reardon: Could the specification read that where out of alignment they should be taken down and reset—that is removing. Now, isn't it a fact that in some of the timbers, there are four inches on each side out of alignment in that tunnel? Now, if that is carried out, we should have to take them down and set them up again, is that not right?

Mr. Peterson: Substantially so, and we would have some other construction to hold it while that is being done.

Mr. Thelen: May I make a suggestion which is directed to the same end you have in mind—so that it will read: "Timbering in both the north and south tunnels shall not be removed and reset before concreting, except in such special instances and under such conditions as the representative of the Industrial Accident Commission on the ground may authorize." That would give you absolute control of the situation.

Mr. Tinning: That would be satisfactory, providing it be understood that there be no intrusion under that section. We expect to have that modified plan there to follow—without intrusion of timber.

Mr. MacDonald: I think it leaves it exclusively in your authority. It is simply with regard to moving the timber.

Mr. Tinning: I thought the wording was such that it might be thought that we would be eliminating consideration of this modified section. It gives you ten inches right there. It only carries where your timbers have intruded more than that, and you eliminate a very large proportion on movement.

Mr. Reardon: That is the business of Mr. Reinhardt and Mr. Lowell of this Commission, and nothing is taken up without their recommendation, or passed upon by Mr. Reinhardt, who is our engineer. Your specifications read just what I have repeated, and Mr. Reinhardt said if you trim, it takes out the tensile strength.

Mr. Tinning: I hope that the order can embody some reference to this section, so that there may be no misunderstanding.

Mr. MacDonald: My thought was that the one clause, amplified as suggested in the language of Mr. Thelen, would cover the entire situation, and that the Commission would rescind the second one, which is not an order, and that will leave it one order dealing solely with the question of timbering, as the order of the Commission, and will recognize, perfectly agreeable I am sure, to the company, the right of the District to reset these, if the contractor accepts this modification of size, and that will be strictly a matter between you and the contractors.

Mr. Tinning: That is satisfactory, providing the order itself is clear with respect to some plan. I did not want it to say that all timber shall not be reset by concreting—it would have to be all timbering outside of this section may be moved under the direction of the Commission, or in a manner satisfactory to the Commission's engineers—something of that kind.

Mr. MacDonald: Can't we add to the clause—it is what you suggested, Mr. Thelen—say, for instance, so that the work may be constructed in accordance with the agreed modified construction plans contained in "Preliminary Joint Highway District No. 13, State of California, Alameda County, Contra Costa County, Modification Type A section," dated September 21, 1935. That will identify it. Is that perfectly agreeable?

Mr. Reardon: We have heard from the contractor's engineer and the District's engineer, but we have not yet heard from our own engineer, and,

as I said before, our guiding spirit is the engineer, and before we submit this, I would like to hear from our Mr. Reinhardt. You people have seen this blueprint—have you seen it, Mr. Reinhardt?

Mr. Reinhardt: Yes.

Mr. MacDonald: Mr. Reinhardt, do you feel that the modified construction will be a safe construction—for the purpose of the stipulations we are setting forth here today, for the completion of the tunnel work?

Mr. Reinhardt: Well, it is an improvement of about forty percent over the old method. We will never get one hundred percent, because the encroachments are too large in some places as much as 12 inches. I do not think it would be practical or possible to design a form that will clear the encroachments, but this will clear conditions anyway fifty percent, and with supervision over the removing the timbers, in which we cannot use this form, I do not see but what it can be done safely. Mention was made of square-setting—of course, the whole tunnel can be square-setted, but time is the essence of the hazard of this tunnel, and to square-set the tunnel will probably take four or five months, and in the four or five months, I would say the tunnel would probably be the same as it is today—so we are speeding the work, and I would estimate that in five weeks we would probably have the tunnel lined, and in the few cases where we have to take the timbers out, it can be safely done under the square-setting, and the proposed supervision. There is

nothing more that I can add. This is a mighty fine scheme, and think that it should be done. In my estimation I think it is the maximum that can be done and still keep our original tunnel.

Mr. MacDonald: In order that I may be clear—it is the intent to only use square-sets where timbers are to be removed?

Mr. Boggs: That is up to the contractor.

Mr. Reinhardt: That is up to the Commission it might have to remove these timbers.

Mr. MacDonald: But there is no intention for the substitution of the general construction with square-sets—it is only to use square-sets where you have to remove the timber in order to put in the proper concrete form.

Mr. Tinning: The District does not control the matter of construction; you will have to ask the contractor.

Mr. MacDonald: It is my understanding that square-sets are only to be used in such cases where you have to remove present timber.

Mr. Peterson: That is correct. We are using a rather popular term when we call them square-sets—it is square-setting—I think that might be a little nearer the proper statement, or I would say other equipment in construction, acceptable to the safety engineers—I think the safety engineers should govern, even in the use of the square-setting method.

Mr. Thelen: That is why I made the suggestion leaving the authority in all special cases in your own hands.

Mr. Reardon: It leaves the responsibility right up to you, then, Mr. Reinhardt.

Mr. Reinhardt: There is no objection to that.

Mr. MacDonald: Mr. Thelen, you wouldn't take unfair advantage?

Mr. Thelen: Absolutely not—I think you are absolutely competent.

Mr. Reinhardt: There is no objection to assuming responsibility, and the only difficulty is the time allowed for inspection. If I am to be there every day, I will be glad to assume responsibility for what I know, with the capable assistance of Mr. Jarrett, who is there, but, of course, I could not be responsible when I am not there. If I am on the bridge, I could not be over on the tunnel, and that is the drawback to the arrangement it seems to me.

Mr. Tinning: Would there be any chance of assigning this gentleman for the four or five weeks that it would take to complete this emergency work, and keeping him there?

Mr, Reardon: No. This Department is unfortunately curtailed not only for the tunnel work, but every department. Mr. Reinhardt, you say this plan would increase the efficiency about 40 percent, but never 100 percent, and then further on in your testimony you said 50 percent better than at the present time. How far would you go on record here that this plan submitted, these blueprints submitted, are as near as possible of making that tunnel secure?

Mr. Reinhardt: Yes, I think I have made that statement. In other words, the plan is the maximum that we can obtain in point of design and still maintain our original tunnel.

Mr. Reardon: As a safety measure, you don't question the designing of that tunnel do you?

Mr. Reinhardt: No, not at all. What I was thinking of when I mentioned the original tunnel was the size and amount of clearance, and so forth.

Mr. Reardon: Are you familiar with these blueprints?

Mr. Reinhardt: Yes.

Mr. Reardon: And you, Mr. Tinning, are you familiar with them?

Mr. Tinning: As much as I am with any blueprints—I can't read them.

Mr. Reardon: Mr. Boggs, you are familiar with the blueprints, and that they are acceptable to you people?

Mr. Boggs: Yes—this is acceptable to us.

Mr. Thelen: We have stated on the strength of Mr. Peterson's statement that is agreeable to us.

Mr. Peterson: We understand this to be a preliminary drawing. We have steel forms already built, and we will assume that the steel forms which we have can be modified in a reasonable way to build this structure, and I think we understand each other on that point, and the contractor is willing to make these modifications.

Mr. Reardon: Well, the three people interested are satisfied. Now, Mr. Lowell, we have not heard from you—you know that tunnel—what is your opinion?

Mr. Lowell: I am not on the tunnel now, but my recommendation to the Commission is that this be the plan—that is, lower the forms so that they could put in the concrete of the proper thickness, without removing the timbers. I made three recommendations, and the first and second were not acceptable, could not be agreed upon, and then the third one, which was the least to be desired.

Mr. Reardon: Read the report, Mr. Burke.

Mr. Burke (reading):

"1. The writer recommends that the Joint Highway District engineers and the engineers for the Six Companies of California agree upon a plan whereby the concreting of the remaining unconcreted portion of the tunnels be done by lowering the forms in the arched section sufficiently so that it will not be necessary to remove and reset new timbers or cut back the present timbers. In that portion of the tunnel where it is necessary to support the timbers, wooden forms shall be constructed around the timber supports and after the forms have been removed, the supports shall be removed and the holes filled with concrete. Other portions of the tunnel where timbers are not supported, steel forms for concreting might be used.

"2. If No. 1 recommendation is not agreed upon, the writer recommends that structural steel shapes be used for tunnel sets and these sets are to be placed between the present wooden sets and allowed to extend 4 inches beyond the neat line of the concrete structure if necessary. This is allowed under Section 32, paragraph 5, under the heading of 'overbreak.' The wooden timbers may then be trimmed back to the neat line and the pouring of concrete proceed as in No. 1.

"3. If numbers 1 and 2 are not acceptable, then the writer recommends supports of all timber sets in heavy ground by square sets and timbers cut back a reasonable distance and others replaced where they have encroached too far. The concreting shall be done with built-in wooden forms and the timber supports removed after the concrete has set and the holes filled with concrete. This suggestion is less desirable than No. 1 or No. 2 but in the opinion of the writer can be done successfully and safely.

"4. It is recommended that in future the arch timbers shall consist of 8 segments instead of 7. In other words, instead of there being a flat top segment, there shall be two segments. The cost of this change, including the added concrete cost, in the judgment of the writer, should be adjusted as is provided under the heading of 'adjustments' in Section 6

of the General Provisions in the Specifications, page 5, paragraph (g), which reads as follows:

"Alterations: 'In case of reduction or increase in quantities of work, by reason of alterations or any cause whatsoever, the Contractor shall accept payment in full at the contract unit prices for the actual quantities of work done and no allowance will be made for anticipated profit due to such reduction or increase.'

"5. It is suggested that in future, the open portion of the fully excavated tunnel be concreted as near to the face of the excavated core as can be done safely without injury to the concrete from blasting and this concreting continue simultaneously with the driving of the headings

(Signed) FRED L. LOWELL."

Mr. Reardon: An objection, Mr. Boggs?

Mr. Boggs: No. I think Mr. Lowell's recommendations, in general, are possible to follow and probably will meet the conditions for safety and accelerate the work .

Mr. Reardon: Mr. Peterson, you heard that?

Mr. Peterson: I think Mr. Lowell's statement covers quite a number of details, some of which we would make use of in the actual work of building forms, etc., and this is what we refer to in the general statement of Mr. Thelen's outline. I think Mr. Thelen's statement, with the addition that was added, covers the thing in a very broad manner.

Mr. Reardon: Mr. Reinhardt, you are familiar with that?

Mr. Reinhardt: That is all right. I think it is along the same lines we are working.

Mr. Reardon: Well, there will be no disagreement when I get through. You fellows will all agree.

Mr. MacDonald: May I ask this question. It is my understanding that there is urgent need of placing the concrete just as rapidly as possible. Am I correct in understanding that it is the intention of the contractors to proceed forthwith with the tunnel lining with reinforced concrete, prior to doing any further excavation work in the two headings?

Mr. Thelen: Yes, that is correct.

Mr. MacDonald: I wish the record to show that.

Mr. Thelen: And furthermore, if I may suggest at this time—I would like to ask Mr. Tinning as to whether it is agreeable to the District if the Commission makes an order along the lines here agreed upon, that we should go ahead and do the work without waiting for the formal order?

Mr. Tinning: It is entirely agreeable with us, I can say for the Board of Directors and Mr. Boggs, that we do have this factor we should consider. I think from our discussion with the State, it will take about 48 hours to get that from the State, but we don't know how long it will take to get the special approval from the Bureau of Public Roads, because it has to come from Washington. We

started the movement as soon as we received this order, we started the machinery of getting it moving rapidly, and we understand it will be given us by wire from Washington, but there may be some delay in that, but we have everything ready, and we will move as rapidly as possible, but it is possible we may have some suggestion from some one in Washington, but as far as the District is concerned, within its power, we are willing to go ahead on that basis.

Mr. Thelen: May I say that I realize that, and that was the reason why I asked the question. I wanted to know if we couldn't go ahead, giving the District the time necessary.

Mr. Tinning: I understand you have 100 feet of the tunnel section where you can go to work immediately without having to reset the timber.

Mr. Peterson: That is only with one set of forms. We are anxious to get all four sets going. We can then work about five times as fast.

Mr. Tinning: In view of our past experience I am rather hesitant to say "sure," because I know there may be some holdup in Washington, but everything seems favorable to proceed immediately.

Mr. Thelen: Then may I say to the members of the Commission, if the Commission will get the order that is agreeable, we will go ahead right away, on the assumption that we will get an order from the District, and will not wait for the technicality of this consent from Washington.

Mr. Tinning: I am speaking for the District, but with the reservation that we do have to finally get this order from the P.W.A., or the Bureau of Public Roads, whichever one has jurisdiction in this matter, to make an order authorizing us to make this change—we cannot do it until we have that authority, and we started Friday trying to get that through.

Mr. Reardon: Mr. Peterson, you made some statement that the position of the work could go ahead without referring to the original design of the tunnel?

Mr. Peterson: There is about 200 feet of the tunnel which can be lined. We are anxious, however, the contractor is anxious to work at about four other places, so that we may proceed five times as fast as it is now proceeding, because, as Mr. Reinhardt points out, we have not only the matter of handling timber, but we have the problem of the weather, which will affect the situation materially, and will add to hazards, so time is a very important factor.

Mr. Reardon: Mr. Reinhardt, is that your opinion also?

Mr. Reinhardt: Yes, sir.

Mr. Reardon: That is about all we can do—to proceed with this job under this blueprint.

Mr. MacDonald: May I ask a question of the engineer of the Six Companies? In the recommendation of Mr. Lowell here, he states: "It is recommended that in future the arch timbers shall

consist of 8 segments instead of 7. In other words, instead of there being a flat top segment. there shall be two segments." Mr. Lowell makes that recommendation, because he feels it is practically a flat arch on the top two segments, and he is fearful you may have another cave-in. Is it your intention to change from a 7 segment to an 8 segment arch there?

Mr. Peterson: I would say, with regard to that, that if it is necessary to use a heavier member on the top, the contractor will do that. We will do anything that is necessary to make that timbering safe.

Mr. MacDonald: Yes, the heavier timber abutting on the lighter frame below, safeguarded. It is not the question alone of the size, but it is the thrust of the ground coming down on that.

Mr. Peterson: I don't think I am prepared to speak on that point. I would rather leave the situation in the position that the contractor will be glad to go over this matter with the Engineer of the Commission, and give it thought, and not give an answer off-hand. We can assure the Commission, however, that we will follow construction which is safe and sufficient for the condition, so far as the size and shape of the timber is concerned. We would rather give more careful consideration to the number of timbers or changes.

Mr. Reardon: Does any one want to say anything further before we leave this room?

Mr. MacDonald: Mr. Muire, you have built a wonderful tunnel that is standing up.

Mr. Thelen: May we thank the Commission for the consideration you have given us.

Mr. MacDonald: Gentlemen, we thank each and every one of you who have come here and assisted, and we appreciate the fine spirit that has been shown here, and we hope with your cooperation, that we will finish the tunnel without any further catastrophe or loss of life.

Mr. Bechtel: We want to do whatever we can in the safest way possible, and will cooperate with you and with the District, and we shall continue to do so.

Meeting adjourned.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's. Ex. No. U U U. Filed April 28, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT XXX

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held July 10, 1934.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From June 4th, 1934 to June 30th, 1934

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. 1
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	.....	23,800	23,800	Cu. Yds.	$ 0.33	7,854.00
2	Overhaul	.....	20,000	20,000	Sta. Yds.	0.005	100.00
3	Structural Excavation—Class "A"	.....	7,300	7,300	Cu. Yds.	1.20	8,760.00
4	Structural Excavation—Class "B"	.....	.....	.....	Cu. Yds.	2.00	.....
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	.....	.....	.....	Lbs.	0.04	.....
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	.....	.....	.....	Cu. Yds.	15.50	.....
9	Concrete Structures—Class "B" Concrete	.....	.....	.....	Cu. Yds.	14.50	.....
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.08	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	.....	.....	.....	Each	19.00	.....
20	Corrugated Metal Pipe Culvert—8 Inch	.....	.....	.....	Lin. Ft.	1.30	.....
21	Corrugated Metal Pipe Culvert—12 Inch	.....	.....	.....	Lin. Ft.	2.00	.....
22	Corrugated Metal Pipe Culvert—18 Inch	.....	.....	.....	Lin. Ft.	3.00	.....
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	.....	.....	.....	Lin. Ft.	1.20	.....
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	.....	.....	.....	Lin. Ft.	1.50	.....
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	.....	.....	.....	Lin. Ft.	1.80	.....
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	.....	.....	.....	Lin. Ft.	4.40	.....
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	.....	.....	.....	Lin. Ft.	8.50	.....
29	Vitrified Pipe Sewers—6 Inch	.....	.....	.....	Lin. Ft.	1.00	.....
30	Vitrified Pipe Sewers—8 Inch	.....	.....	.....	Lin. Ft.	1.20	.....
31	Manholes—Standard Tops	.....	.....	.....	Each	90.00	.....
32	Manholes—Inlet Tops	.....	.....	.....	Each	100.00	.....
33	Manholes—Grating Tops	.....	.....	.....	Each	90.00	.....
34	Storm Water Inlets—34 Inch Openings	.....	.....	.....	Each	75.00	.....
35	Storm Water Inlets—"B"	.....	.....	.....	Each	100.00	.....
36	Storm Water Inlets—"C"	.....	.....	.....	Each	80.00	.....
37	Lamp Holes—6 Inch	.....	.....	.....	Each	24.00	.....
38	Lamp Holes—8 Inch	.....	.....	.....	Each	26.00	.....
39	Lamp Holes—12 Inch	.....	.....	.....	Each	36.00	.....
40	Hand Hole	.....	.....	.....	Each	30.00	.....
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	.....	.....	.....	Lin. Ft.	1.40	.....
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	.....	.....	.....	Lin. Ft.	0.80	.....
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	.....	.....	.....	Cu. Yds.	5.00	.....
46	Metal Cribbing	.....	.....	.....	Lbs.	0.15	.....
47	Stone or Gravel for Foundations	.....	27	27	Cu. Yds.	3.00	81.00
48	Tunnel Construction—Type "A"	.....	.....	.....	Lin. Ft.	325.00	.....
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
51	Ventilation Buildings—West and East Bldgs., Complete	.....	1%	1%	Lump Sum	$40,000.00	3,400.00
52	Ventilation Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	160,000.00	.....
53	Mechanical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	60,000.00	.....
54	Electrical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	210,000.00	.....
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	20,195.00
Deductions—25% of Work Done	5,048.75
Deduction—$100,000	.....
Deduction—10% of Work Done	.....
Total Due to Date	15,146.25
Previous Payments	.....
Balance Due on This Estimate	15,146.25

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held November 6, 1934.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From October 1, 1934 to October 31, 1934

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Five
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	414,256	204,614	618,870	Cu. Yds.	$ 0.33	204,227.10
2	Overhaul	280,000	1,000,000	1,280,000	Sta. Yds.	0.005	6,400.00
3	Structural Excavation—Class "A"	25,164	5,487	30,651	Cu. Yds.	1.20	36,781.20
4	Structural Excavation—Class "B"	10	.....	10	Cu. Yds.	2.00	20.00
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	739,996	257,982	997,978	Lbs.	0.04	39,919.12
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	3,646	1,730	5,376	Cu. Yds.	15.50	83,328.00
9	Concrete Structures—Class "B" Concrete	856	.....	856	Cu. Yds.	14.50	12,412.00
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.08	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	.....	.....	.....	Each	12.00	.....
20	Corrugated Metal Pipe Culvert—8 Inch	70	.....	70	Lin. Ft.	1.30	91.00
21	Corrugated Metal Pipe Culvert—12 Inch	.....	.....	.....	Lin. Ft.	2.00	.....
22	Corrugated Metal Pipe Culvert—18 Inch	276	106	382	Lin. Ft.	3.00	1,146.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	.....	.....	.....	Lin. Ft.	1.20	.....
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	34	.....	34	Lin. Ft.	1.50	51.00
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	160	.....	160	Lin. Ft.	1.80	288.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,200	78	1,278	Lin. Ft.	4.40	5,623.20
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	.....	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	180	.....	180	Lin. Ft.	1.00	180.00
30	Vitrified Pipe Sewers—8 Inch	.....	.....	.....	Lin. Ft.	1.20	.....
31	Manholes—Standard Tops	6	.....	6	Each	90.00	540.00
32	Manholes—Inlet Tops	2	.....	2	Each	100.00	200.00
33	Manholes—Grating Tops	.....	.....	.....	Each	90.00	.....
34	Storm Water Inlets—24 Inch Openings	.....	.....	.....	Each	75.00	.....
35	Storm Water Inlets—"B"	.....	.....	.....	Each	100.00	.....
36	Storm Water Inlets—"C"	.....	.....	.....	Each	80.00	.....
37	Lamp Holes—6 Inch	1	.....	1	Each	24.00	24.00
38	Lamp Holes—8 Inch	.....	.....	.....	Each	26.00	.....
39	Lamp Holes—12 Inch	.....	.....	.....	Each	36.00	.....
40	Hand Hole	.....	.....	.....	Each	30.00	.....
41	Underdrains—6 In. Perf. Corrug. Metal Pipe	1,430	96	1,526	Lin. Ft.	1.40	2,136.40
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	.....	53	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	.....	.....	.....	Cu. Yds.	5.00	.....
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	261	1	262	Cu. Yds.	3.00	786.00
48	Tunnel Construction—Type "A"	50	30	80	Lin. Ft.	325.00	26,000.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
51	Ventilation Buildings—West and East Bldgs., Complete	19%	3%	22%	Lump Sum	340,000.00	74,800.00
52	Ventilation Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	160,000.00	.....
53	Mechanical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	60,000.00	.....
54	Electrical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	210,000.00	.....
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	499,916.92
Deductions—25% of Work Done	.....
Deduction—$100,000	100,000.00
Deduction—10% of Work Done	.....
Total Due to Date	399,916.92
Previous Payments	272,163.46
Balance Due on This Estimate	127,753.46

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held December 6, 1934.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work
From November 1, 1934 to November 30, 1934

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Six
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	618,870	85,142	704,012	Cu. Yds.	$ 0.33	232,323.96
2	Overhaul	1,280,000	410,000	1,690,000	Sta. Yds.	0.005	8,450.00
3	Structural Excavation—Class "A"	30,651	397	31,048	Cu. Yds.	1.20	37,257.60
4	Structural Excavation—Class "B"	10	.....	10	Cu. Yds.	2.00	20.00
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	997,978	338,387	1,336,365	Lbs.	0.04	53,454.60
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	5,376	1,543	6,919	Cu. Yds.	15.50	107,244.50
9	Concrete Structures—Class "B" Concrete	856	.....	856	Cu. Yds.	14.50	12,412.00
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.08	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Pill Protectors	.....	.....	.....	Each	19.00	.....
20	Corrugated Metal Pipe Culvert—8 Inch	70	.....	70	Lin. Ft.	1.30	91.00
21	Corrugated Metal Pipe Culvert—12 Inch	.....	136	136	Lin. Ft.	2.00	272.00
22	Corrugated Metal Pipe Culvert—16 Inch	382	56	438	Lin. Ft.	3.00	1,314.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	.....	.....	.....	Lin. Ft.	1.20	.....
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	34	.....	34	Lin. Ft.	1.50	51.00
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	160	.....	160	Lin. Ft.	1.80	288.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,278	46	1,324	Lin. Ft.	4.40	5,825.60
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	.....	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	180	20	200	Lin. Ft.	1.00	200.00
30	Vitrified Pipe Sewers—8 Inch	.....	30	30	Lin. Ft.	1.20	36.00
31	Manholes—Standard Tops	6	.....	6	Each	90.00	540.00
32	Manholes—Inlet Tops	2	.....	2	Each	100.00	200.00
33	Manholes—Grating Tops	.....	2	2	Each	90.00	180.00
34	Storm Water Inlets—24 Inch Openings	.....	.....	.....	Each	75.00	.....
35	Storm Water Inlets—"B"	.....	.....	.....	Each	100.00	.....
36	Storm Water Inlets—"C"	.....	3	3	Each	80.00	240.00
37	Lamp Holes—6 Inch	1	.....	1	Each	24.00	24.00
38	Lamp Holes—8 Inch	.....	.....	.....	Each	26.00	.....
39	Lamp Holes—12 Inch	.....	.....	.....	Each	36.00	.....
40	Hand Hole	.....	.....	.....	Each	30.00	.....
41	Underdrains—6 In. Perf. Corrug. Metal Pipe	1,526	.....	1,526	Lin. Ft.	1.40	2,136.40
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	53	.....	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	.....	.....	.....	Cu. Yds.	5.00	.....
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	262	4	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	80	49	129	Lin. Ft.	325.00	41,925.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
51	Ventilation Buildings—West and East Bldgs., Complete	22%	6%	28%	Lump Sum	$40,000.00	95,200.00
52	Ventilation Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	160,000.00	.....
53	Mechanical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	60,000.00	.....
54	Electrical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	210,000.00	.....
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS
Checked by A. S. GELSTON
Approved J. W. BARKLEY
Chief Asst. Engr.
Approved.....
Approved.....

Total Value of Work Done to Date	605,447.56
Deductions—25% of Work Done	.....
Deduction—$100,000	100,000.00
Deduction—10% of Work Done	.....
Total Due to Date	505,447.56
Previous Payments	399,916.92
Balance Due on This Estimate	105,530.64

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

MICROCARD
TRADE MARK ®

MICROCARD®
EDITIONS, INC.
PUBLISHER OF ORIGINAL AND REPRINT MATERIALS ON MICROCARD AND MICROFICHES
901 TWENTY-SIXTH STREET, N.W., WASHINGTON, D.C. 20037. PHONE (202) 333-6393

microcard

CARD 54





DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held August 9, 1934.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From July 1, 193_ to July 31, 1934

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. 2
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	23,800	101,600	125,400	Cu. Yds.	$ 0.33	41,382
2	Overhaul	20,000	69,000	89,000	Sta. Yds.	0.005	445
3	Structural Excavation—Class "A"	7,300	4,000	11,300	Cu. Yds.	1.20	13,560
4	Structural Excavation—Class "B"	.....	10	10	Cu. Yds.	3.00	30
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	.....	107,400	107,400	Lbs.	0.04	4,296
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	.....	292	292	Cu. Yds.	15.50	4,526
9	Concrete Structures—Class "B" Concrete	.....	242	242	Cu. Yds.	14.50	3,509
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.08	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	.....	.....	.....	Each	19.00	.....
20	Corrugated Metal Pipe Culvert—8 Inch	.....	50	50	Lin. Ft.	1.30	65
21	Corrugated Metal Pipe Culvert—12 Inch	.....	.....	.....	Lin. Ft.	2.00	.....
22	Corrugated Metal Pipe Culvert—18 Inch	.....	.....	.....	Lin. Ft.	3.00	.....
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	.....	.....	.....	Lin. Ft.	1.20	.....
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	.....	.....	.....	Lin. Ft.	1.50	.....
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	.....	.....	.....	Lin. Ft.	1.80	.....
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.90	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	.....	.....	.....	Lin. Ft.	4.40	.....
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	.....	.....	.....	Lin. Ft.	6.50	.....
29	Vitrified Pipe Sewers—6 Inch	.....	.....	.....	Lin. Ft.	1.00	.....
30	Vitrified Pipe Sewers—8 Inch	.....	.....	.....	Lin. Ft.	1.20	.....
31	Manholes—Standard Tops	.....	.....	.....	Each	90.00	.....
32	Manholes—Inlet Tops	.....	.....	.....	Each	100.00	.....
33	Manholes—Grating Tops	.....	.....	.....	Each	80.00	.....
34	Storm Water Inlets—24 Inch Openings	.....	.....	.....	Each	75.00	.....
35	Storm Water Inlets—"B"	.....	.....	.....	Each	100.00	.....
36	Storm Water Inlets—"C"	.....	.....	.....	Each	80.00	.....
37	Lamp Holes—6 Inch	.....	.....	.....	Each	24.00	.....
38	Lamp Holes—8 Inch	.....	.....	.....	Each	26.00	.....
39	Lamp Holes—12 Inch	.....	.....	.....	Each	36.00	.....
40	Hand Hole	.....	.....	.....	Each	30.00	.....
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	.....	140	140	Lin. Ft.	1.40	196
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	.....	.....	.....	Lin. Ft.	0.80	.....
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	.....	.....	.....	Cu. Yds.	5.00	.....
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	27	60	87	Cu. Yds.	3.00	361
48	Tunnel Construction—Type "A"	.....	.....	.....	Lin. Ft.	325.00	.....
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
51	Ventilation Buildings—West and East Bldgs., Complete	1%	2%	3%	Lump Sum	340,000.00	10,200
52	Ventilation Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	160,000.00	.....
53	Mechanical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	60,000.00	.....
54	Electrical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	210,000.00	.....
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	78,460
Deductions—25% of Work Done	19,615
Deduction—$100,000	.....
Deduction—10% of Work Done	.....
Total Due to Date	58,845
Previous Payments	15,146.25
Balance Due on This Estimate	43,698.75

This Estimate Approved WARLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held September 11, 1934.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work
From August 1, 1934 to August 31, 1934

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Three
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	125,427	128,997	254,424	Cu. Yds.	$ 0.33	83,959.92
2	Overhaul	89,000	97,000	186,000	Sta. Yds.	0.005	930.00
3	Structural Excavation—Class "A"	11,300	5,253	16,553	Cu. Yds.	1.20	19,863.60
4	Structural Excavation—Class "B"	10	.....	10	Cu. Yds.	2.00	20.00
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	107,400	299,481	406,881	Lbs.	0.04	16,275.24
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	292	1,611	1,903	Cu. Yds.	15.50	29,496.50
9	Concrete Structures—Class "B" Concrete	242	457	699	Cu. Yds.	14.50	10,135.50
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.08	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	.....	.....	.....	Each	19.00	.....
20	Corrugated Metal Pipe Culvert—8 Inch	50	20	70	Lin. Ft.	1.30	91.00
21	Corrugated Metal Pipe Culvert—12 Inch	.....	.....	.....	Lin. Ft.	2.00	.....
22	Corrugated Metal Pipe Culvert—18 Inch	.....	276	276	Lin. Ft.	3.00	828.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	.....	.....	.....	Lin. Ft.	1.20	.....
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	.....	.....	.....	Lin. Ft.	1.50	.....
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	.....	160	160	Lin. Ft.	1.80	288.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	.....	984	984	Lin. Ft.	4.40	4,329.60
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	.....	.....	.....	Lin. Ft.	8.50	.....
29	Vitrified Pipe Sewers—6 Inch	.....	.....	.....	Lin. Ft.	1.00	.....
30	Vitrified Pipe Sewers—8 Inch	.....	.....	.....	Lin. Ft.	1.20	.....
31	Manholes—Standard Tops	.....	.....	.....	Each	90.00	.....
32	Manholes—Inlet Tops	.....	.....	.....	Each	100.00	.....
33	Manholes—Grating Tops	.....	.....	.....	Each	90.00	.....
34	Storm Water Inlets—24 Inch Openings	.....	.....	.....	Each	75.00	.....
35	Storm Water Inlets—"B"	.....	.....	.....	Each	100.00	.....
36	Storm Water Inlets—"C"	.....	.....	.....	Each	80.00	.....
37	Lamp Holes—6 Inch	.....	.....	.....	Each	24.00	.....
38	Lamp Holes—8 Inch	.....	.....	.....	Each	26.00	.....
39	Lamp Holes—12 Inch	.....	.....	.....	Each	36.00	.....
40	Hand Hole	.....	.....	.....	Each	30.00	.....
41	Underdrains—6 In. Perf. Corrug. Metal Pipe	140	1,040	1,180	Lin. Ft.	1.40	1,652.00
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	.....	.....	.....	Lin. Ft.	0.80	.....
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	.....	.....	.....	Cu. Yds.	5.00	.....
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	87	163	250	Cu. Yds.	3.00	750.00
48	Tunnel Construction—Type "A" 50% of 40 ft.	.....	20	20	Lin. Ft.	325.00	6,500.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
52	Ventilation Buildings—West and East Bldgs., Complete	.....	.....	.....	Lump Sum	340,000.00	.....
51	Ventilation Equipment—Furn. and Install. Complete	3%	7%	10%	Lump Sum	160,000.00	34,000.00
53	Mechanical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	60,000.00	.....
54	Electrical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	210,000.00	.....
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	209,119.36
Deductions—25% of Work Done	52,279.84
Deduction—$100,000	.....
Deduction—10% of Work Done	.....
Total Due to Date	156,839.52
Previous Payments	58,845.00
Balance Due on This Estimate	97,994.52

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held October 9, 1934.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Four
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

From September 1, 1934 to September 30, 1934

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	254,424	159,832	414,256	Cu. Yds.	$ 0.33	136,704.48
2	Overhaul	186,000	94,000	280,000	Sta. Yds.	0.005	1,400.00
3	Structural Excavation—Class "A"	16,553	8,611	25,164	Cu. Yds.	1.20	30,196.80
4	Structural Excavation—Class "B"	10	0	10	Cu. Yds.	2.00	20.00
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	406,881	333,115	739,996	Lbs.	0.04	29,599.84
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	1,903	1,743	3,646	Cu. Yds.	15.50	56,513.00
9	Concrete Structures—Class "B" Concrete	699	157	856	Cu. Yds.	14.50	12,412.00
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.08	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	.....	.....	.....	Each	19.00	.....
20	Corrugated Metal Pipe Culvert—6 Inch	70	.....	70	Lin. Ft.	1.30	91.00
21	Corrugated Metal Pipe Culvert—12 Inch	.....	.....	.....	Lin. Ft.	2.00	.....
22	Corrugated Metal Pipe Culvert—18 Inch	276	.....	276	Lin. Ft.	3.00	828.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	.....	.....	.....	Lin. Ft.	1.20	.....
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	.....	34	34	Lin. Ft.	1.50	51.00
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	160	.....	160	Lin. Ft.	1.80	288.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	984	216	1,200	Lin. Ft.	4.40	5,280.00
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	.....	579	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	.....	180	180	Lin. Ft.	1.00	180.00
30	Vitrified Pipe Sewers—8 Inch	.....	.....	.....	Lin. Ft.	1.20	.....
31	Manholes—Standard Tops	.....	6	6	Each	90.00	540.00
32	Manholes—Inlet Tops	.....	2	2	Each	100.00	200.00
33	Manholes—Grating Tops	.....	.....	.....	Each	90.00	.....
34	Storm Water Inlets—24 Inch Openings	.....	.....	.....	Each	75.00	.....
35	Storm Water Inlets—"B"	.....	.....	.....	Each	100.00	.....
36	Storm Water Inlets—"C"	.....	.....	.....	Each	80.00	.....
37	Lamp Holes—6 Inch	.....	1	1	Each	24.00	24.00
38	Lamp Holes—8 Inch	.....	.....	.....	Each	26.00	.....
39	Lamp Holes—12 Inch	.....	.....	.....	Each	36.00	.....
40	Hand Hole	.....	.....	.....	Each	30.00	.....
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	1,180	250	1,430	Lin. Ft.	1.40	2,002.00
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	.....	.....	.....	Lin. Ft.	0.80	.....
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	.....	.....	.....	Cu. Yds.	5.00	.....
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	250	11	261	Cu. Yds.	3.00	783.00
48	Tunnel Construction—Type "A"	20	30	50	Lin. Ft.	325.00	16,250.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
51	Ventilation Buildings—West and East Bldgs., Complete	10%	9%	19%	Lump Sum	$40,000.00	64,600.00
52	Ventilation Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	160,000.00	.....
53	Mechanical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	60,000.00	.....
54	Electrical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	210,000.00	.....
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Total Value of Work Done to Date	362,884.62
Deductions—25% of Work Done	90,721.16
Deduction—$100,000	.....
Deduction—10% of Work Done	.....
Total Due to Date	272,163.46
Previous Payments	156,839.52
Balance Due on This Estimate	115,323.94

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved .....

Approved .....

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

438

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held January 8, 1935.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work
From December 1, 1934 to December 31, 1934

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Seven
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	704,012	13,437	717,449	Cu. Yds.	$ 0.33	236,758.17
2	Overhaul	1,690,000	———	1,690,000	Sta. Yds.	0.005	8,450.00
3	Structural Excavation—Class "A"	31,048	1,595	32,643	Cu. Yds.	1.20	39,171.60
4	Structural Excavation—Class "B"	10	127	137	Cu. Yds.	2.00	274.00
5	Shoulders	———	———	———	Sq. Ft.	0.035	———
6	Reinforcing Steel	1,336,365	159,000	1,495,365	Lbs.	0.04	59,814.60
7	Structural Steel	———	———	———	Lbs.	0.05	———
8	Concrete Structures—Class "A" Concrete	6,919	1,379	8,298	Cu. Yds.	15.50	128,619.00
9	Concrete Structures—Class "B" Concrete	856	———	856	Cu. Yds.	14.50	12,412.00
10	Portland Cement Concrete Pavement—6 Inch	———	———	———	Sq. Ft.	0.24	———
11	Portland Cement Concrete Pavement—8 Inch	———	———	———	Sq. Ft.	0.18	———
12	Asphalt Concrete	———	———	———	Sq. Ft.	0.06	———
13	Penetration Oil Macadam Pavement	———	———	———	Sq. Ft.	0.14	———
14	Concrete Curbs—6 Inch	———	———	———	Lin. Ft.	0.52	———
15	Concrete Curbs—12 Inch	———	———	———	Lin. Ft.	0.80	———
16	Concrete Curbs—6 Inch with Guard	———	———	———	Lin. Ft.	1.00	———
17	Concrete Gutters	———	———	———	Sq. Ft.	0.25	———
18	Cement Sidewalks	———	———	———	Sq. Ft.	0.13	———
19	Fill Protectors	———	———	———	Each	19.00	———
20	Corrugated Metal Pipe Culvert—6 Inch	70	———	70	Lin. Ft.	1.30	91.00
21	Corrugated Metal Pipe Culvert—12 Inch	136	———	136	Lin. Ft.	2.00	272.00
22	Corrugated Metal Pipe Culvert—18 Inch	438	———	438	Lin. Ft.	3.00	1,314.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	———	———	———	Lin. Ft.	1.20	———
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	34	———	34	Lin. Ft.	1.50	51.00
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	160	235	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	———	———	———	Lin. Ft.	2.00	———
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,324	———	1,324	Lin. Ft.	4.40	5,825.60
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	———	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	200	———	200	Lin. Ft.	1.00	200.00
30	Vitrified Pipe Sewers—8 Inch	30	27	57	Lin. Ft.	1.20	68.40
31	Manholes—Standard Tops	6	———	6	Each	90.00	540.00
32	Manholes—Inlet Tops	2	———	2	Each	100.00	200.00
33	Manholes—Grating Tops	2	1	3	Each	90.00	270.00
34	Storm Water Inlets—24 Inch Openings	———	———	———	Each	75.00	———
35	Storm Water Inlets—"B"	———	———	———	Each	100.00	———
36	Storm Water Inlets—"C"	3	———	3	Each	80.00	240.00
37	Lamp Holes—6 Inch	1	———	1	Each	24.00	24.00
38	Lamp Holes—8 Inch	———	———	———	Each	26.00	———
39	Lamp Holes—12 Inch	———	1	1	Each	36.00	36.00
40	Hand Hole	———	———	———	Each	30.00	———
41	Underdrains—6 In. Perf. Corrug. Metal Pipe	1,526	60	1,586	Lin. Ft.	1.40	2,220.40
42	Piping Cast Iron—6 Inch	———	———	———	Lin. Ft.	1.50	———
43	Guard Rail	53	———	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	———	———	———	Lin. Ft.	3.00	———
45	Riprap	———	126	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	———	———	———	Lbs.	0.13	———
47	Stone or Gravel for Foundations	266	———	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	129	45	174	Lin. Ft.	325.00	56,550.00
49	Tunnel Construction—Type "B"	———	———	———	Lin. Ft.	400.00	———
50	Cross Adits	———	———	———	Lin. Ft.	40.00	———
51	Ventilation Buildings—West and East Bldgs., Complete	28%	3%	31%	Lump Sum	340,000.00	105,400.00
52	Ventilation Equipment—Furn. and Install. Complete	———	———	———	Lump Sum	160,000.00	———
53	Mechanical Equipment—Furn. and Install. Complete	———	———	———	Lump Sum	60,000.00	———
54	Electrical Equipment—Furn. and Install. Complete	———	3½%	3½%	Lump Sum	210,000.00	7,350.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	———	———	———	Lump Sum	15,000.00	———

Estimate Made by C. E. RIGGS
Checked by A. S. GELSTON
Approved J. W. BARKLEY
Chief Asst. Engr.
Approved ———
Approved ———

Total Value of Work Done to Date	673,254.67
Deductions—25% of Work Done	———
Deduction—$100,000	100,000.00
Deduction—10% of Work Done	———
Total Due to Date	573,254.67
Previous Payments	505,447.56
Balance Due on This Estimate	67,807.11

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

441

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held February 6, 1935.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From January 1, 1935 to January 31, 1935

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Eight
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	717,449	15,670	733,119	Cu. Yds.	$ 0.33	$ 241,929.27
2	Overhaul	1,690,000	95,000	1,785,000	Sta. Yds.	0.005	8,925.00
3	Structural Excavation—Class "A"	32,643	112	32,755	Cu. Yds.	1.20	39,306.00
4	Structural Excavation—Class "B"	137	———	137	Cu. Yds.	2.00	274.00
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	1,495.365	28,550	1,523,915	Lbs.	0.04	60,956.60
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	8,298	206	8,504	Cu. Yds.	15.50	131,812.00
9	Concrete Structures—Class "B" Concrete	856	minus 51.2	804.8	Cu. Yds.	14.50	11,669.60
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.06	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	.....	.....	.....	Each	12.00	.....
20	Corrugated Metal Pipe Culvert—6 Inch	70	———	70	Lin. Ft.	1.30	91.00
21	Corrugated Metal Pipe Culvert—12 Inch	136	.....	136	Lin. Ft.	2.00	272.00
22	Corrugated Metal Pipe Culvert—18 Inch	438	———	438	Lin. Ft.	3.00	1,314.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	.....	.....	.....	Lin. Ft.	1.20	.....
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	34	213	247	Lin. Ft.	1.50	370.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	.....	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,324	.....	1,324	Lin. Ft.	4.40	5,825.60
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	.....	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	200	5	205	Lin. Ft.	1.00	205.00
30	Vitrified Pipe Sewers—8 Inch	57	.....	57	Lin. Ft.	1.20	68.40
31	Manholes—Standard Tops	6	.....	6	Each	90.00	540.00
32	Manholes—Inlet Tops	2	.....	2	Each	100.00	200.00
33	Manholes—Grating Tops	3	.....	3	Each	90.00	270.00
34	Storm Water Inlets—24 Inch Openings	.....	.....	.....	Each	75.00	.....
35	Storm Water Inlets—"B"	.....	.....	.....	Each	100.00	.....
36	Storm Water Inlets—"C"	3	.....	3	Each	80.00	240.00
37	Lamp Holes—6 Inch	1	.....	1	Each	24.00	24.00
38	Lamp Holes—8 Inch	.....	.....	.....	Each	26.00	.....
39	Lamp Holes—12 Inch	1	1	2	Each	36.00	72.00
40	Hand Hole	.....	.....	.....	Each	30.00	.....
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	1,586	40	1,626	Lin. Ft.	1.40	2,276.40
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	53	———	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	126	.....	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	266	.....	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	174	74	248	Lin. Ft.	325.00	80,600.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
51	Ventilation Buildings—West and East Bldgs., Complete	31%	2%	33%	Lump Sum	$40,000.00	112,200.00
52	Ventilation Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	160,000.00	.....
53	Mechanical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	60,000.00	.....
54	Electrical Equipment—Furn. and Install. Complete	3½%	———	3½%	Lump Sum	210,000.00	7,350.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	713,894.27
Deductions—25% of Work Done	.....
Deduction—$100,000	100,000.00
Deduction—10% of Work Done	.....
Total Due to Date	613,894.27
Previous Payments	573,254.67
Balance Due on This Estimate	40,639.60

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held March 9, 1935.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From February 1, 1935 to February 28, 1935

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Nine
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	733,119	.....	733,119	Cu. Yds.	$ 0.33	241,929.27
2	Overhaul	1,785,000	445,828	2,230,828	Sta. Yds.	0.005	11,154.14
3	Structural Excavation—Class "A"	32,755	79	32,834	Cu. Yds.	1.20	39,400.80
4	Structural Excavation—Class "B"	137	.....	137	Cu. Yds.	2.00	274.00
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	1,523,915	.....	1,523,915	Lbs.	0.04	60,956.60
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	8,504	.....	8,504	Cu. Yds.	15.50	131,812.00
9	Concrete Structures—Class "B" Concrete	804.8	.....	804.8	Cu. Yds.	14.50	11,669.60
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.08	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	.....	.....	.....	Each	19.00	.....
20	Corrugated Metal Pipe Culvert—8 Inch	70	28	98	Lin. Ft.	1.30	127.40
21	Corrugated Metal Pipe Culvert—12 Inch	136	.....	136	Lin. Ft.	2.00	272.00
22	Corrugated Metal Pipe Culvert—18 Inch	438	.....	438	Lin. Ft.	3.00	1,314.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	.....	48	48	Lin. Ft.	1.20	57.60
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	247	306	553	Lin. Ft.	1.50	829.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	.....	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,324	2	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	.....	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	205	10	215	Lin. Ft.	1.00	215.00
30	Vitrified Pipe Sewers—8 Inch	57	.....	57	Lin. Ft.	1.20	68.40
31	Manholes—Standard Tops	6	1	7	Each	90.00	630.00
32	Manholes—Inlet Tops	2	.....	2	Each	100.00	200.00
33	Manholes—Grating Tops	3	.....	3	Each	90.00	270.00
34	Storm Water Inlets—24 Inch Openings	.....	.....	.....	Each	75.00	.....
35	Storm Water Inlets—"B"	.....	2	2	Each	100.00	200.00
36	Storm Water Inlets—"C"	3	.....	3	Each	80.00	240.00
37	Lamp Holes—6 Inch	1	.....	1	Each	24.00	24.00
38	Lamp Holes—8 Inch	.....	.....	.....	Each	26.00	.....
39	Lamp Holes—12 Inch	2	.....	2	Each	36.00	72.00
40	Hand Hole	.....	1	1	Each	30.00	30.00
41	Underdrain 8 In. Perf. Corrug. Metal Pipe	1,626	.....	1,626	Lin. Ft.	1.40	2,276.40
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	53	.....	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	126	.....	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	266	.....	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	248	106	354	Lin. Ft.	325.00	115,050.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
51	Ventilation Buildings—West and East Bldgs., Complete	33%	2%	35%	Lump Sum	$40,000.00	119,000.00
52	Ventilation Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	160,000.00	.....
53	Mechanical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	60,000.00	.....
54	Electrical Equipment—Furn. and Install. Complete	3½%	.....	3½%	Lump Sum	$10,000.00	7,350.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	758,360.01
Deductions—85% of Work Done	.....
Deduction—$100,000	100,000.00
Deduction—10% of Work Done	.....
Total Due to Date	658,360.01
Previous Payments	613,894.27
Balance Due on This Estimate	44,465.74

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held April 4th, 1935.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Ten
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

Estimate of Work

From March 1, 1935 to March 31, 1935

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	733,119	301	733,420	Cu. Yds.	$ 0.33	242,028.60
2	Overhaul	2,230,828	46,600	2,277,428	Sta. Yds.	0.005	11,387.14
3	Structural Excavation—Class "A"	32,834	785	33,619	Cu. Yds.	1.20	40,342.80
4	Structural Excavation—Class "B"	137	.....	137	Cu. Yds.	2.00	274.00
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	1,523,915	64,000	1,587,915	Lbs.	0.04	63,516.60
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	8,504	326	8,830	Cu. Yds.	15.50	136,865.00
9	Concrete Structures—Class "B" Concrete	804.8	.....	804.8	Cu. Yds.	14.50	11,669.60
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.06	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	98	.....	98	Each	19.00	127.40
20	Corrugated Metal Pipe Culvert—8 Inch	136	.....	136	Lin. Ft.	1.30	272.00
21	Corrugated Metal Pipe Culvert—12 Inch	438	.....	438	Lin. Ft.	2.00	1,314.00
22	Corrugated Metal Pipe Culvert—18 Inch	48	.....	48	Lin. Ft.	3.00	57.60
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	553	.....	553	Lin. Ft.	1.20	829.50
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	395	.....	395	Lin. Ft.	1.50	711.00
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	.....	.....	.....	Lin. Ft.	1.80	.....
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	1,326	.....	1,326	Lin. Ft.	2.00	5,834.40
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	579	.....	579	Lin. Ft.	4.40	4,921.50
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	215	.....	215	Lin. Ft.	3.50	215.00
29	Vitrified Pipe Sewers—6 Inch	57	.....	57	Lin. Ft.	1.00	68.40
30	Vitrified Pipe Sewers—8 Inch	7	.....	7	Lin. Ft.	1.20	630.00
31	Manholes—Standard Tops	2	.....	2	Each	90.00	200.00
32	Manholes—Inlet Tops	3	.....	3	Each	100.00	270.00
33	Manholes—Grating Tops	.....	.....	.....	Each	90.00	.....
34	Storm Water Inlets—24 Inch Openings	2	.....	2	Each	75.00	200.00
35	Storm Water Inlets—"B"	3	.....	3	Each	100.00	240.00
36	Storm Water Inlets—"C"	1	.....	1	Each	80.00	24.00
37	Lamp Holes—6 Inch	.....	.....	.....	Each	24.00	.....
38	Lamp Holes—8 Inch	2	.....	2	Each	26.00	72.00
39	Lamp Holes—12 Inch	1	.....	1	Each	36.00	30.00
40	Hand Hole	1,626	.....	1,626	Each	30.00	2,276.40
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	.....	.....	.....	Lin. Ft.	1.40	.....
42	Piping Cast Iron—6 Inch	53	.....	53	Lin. Ft.	1.50	42.40
43	Guard Rail	.....	.....	.....	Lin. Ft.	0.80	.....
44	Pipe Hand Rail	126	.....	126	Lin. Ft.	3.00	630.00
45	Riprap	.....	.....	.....	Cu. Yds.	5.00	.....
46	Metal Cribbing	266	.....	266	Lbs.	0.13	798.00
47	Stone or Gravel for Foundations	354	118	472	Cu. Yds.	3.00	153,400.00
48	Tunnel Construction—Type "A"	.....	.....	.....	Lin. Ft.	325.00	.....
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
51	Ventilation Buildings—West and East Bldgs., Complete	35%	3%	38%	Lump Sum	$40,000.00	129,200.00
52	Ventilation Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	160,000.00	.....
53	Mechanical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	60,000.00	.....
54	Electrical Equipment—Furn. and Install. Complete	3½%	1½%	5%	Lump Sum	210,000.00	10,500.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Total Value of Work Done to Date	818,947.34
Deductions—85% of Work Done	
Deduction—$100,000	100,000.00
Deduction—10% of Work Done	
Total Due to Date	718,947.34
Previous Payments	658,360.01
Balance Due on This Estimate	60,587.33

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved .....

Approved .....

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held May 9, 1935.

HARRY M. STOW, Secretary
By J. V. EATON, Assistant Secretary

Estimate of Work

From April 1, 1935 to April 30, 1935

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Eleven
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	733,420	.....	733,420	Cu. Yds.	$ 0.33	242,028.60
2	Overhaul	2,277,428	49,280	2,326,708	Sta. Yds.	0.005	11,633.54
3	Structural Excavation—Class "A"	33,619	332	33,951	Cu. Yds.	1.20	40,741.20
4	Structural Excavation—Class "B"	137	126	263	Cu. Yds.	2.00	526.00
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	1,587,915	73,450	1,661,365	Lbs.	0.04	66,454.60
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	8,830	306	9,136	Cu. Yds.	15.50	141,608.00
9	Concrete Structures—Class "B" Concrete	804.8	170.2	975.0	Cu. Yds.	14.50	14,137.50
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.08	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	.....	.....	.....	Each	12.00	.....
20	Corrugated Metal Pipe Culvert—8 Inch	98	.....	98	Lin. Ft.	1.30	127.40
21	Corrugated Metal Pipe Culvert—12 Inch	136	.....	136	Lin. Ft.	2.00	272.00
22	Corrugated Metal Pipe Culvert—18 Inch	438	.....	438	Lin. Ft.	3.00	1,314.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	48	.....	48	Lin. Ft.	1.20	57.60
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	553	.....	553	Lin. Ft.	1.50	829.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	.....	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	.....	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	.....	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	215	.....	215	Lin. Ft.	1.00	215.00
30	Vitrified Pipe Sewers—8 Inch	57	.....	57	Lin. Ft.	1.20	68.40
31	Manholes—Standard Tops	7	.....	7	Each	90.00	630.00
32	Manholes—Inlet Tops	2	.....	2	Each	100.00	200.00
33	Manholes—Grating Tops	3	.....	3	Each	90.00	270.00
34	Storm Water Inlets—24 Inch Openings	.....	.....	.....	Each	75.00	.....
35	Storm Water Inlets—"B"	2	.....	2	Each	100.00	200.00
36	Storm Water Inlets—"C"	3	.....	3	Each	80.00	240.00
37	Lamp Holes—6 Inch	1	.....	1	Each	24.00	24.00
38	Lamp Holes—8 Inch	.....	.....	.....	Each	26.00	.....
39	Lamp Holes—12 Inch	2	.....	2	Each	36.00	72.00
40	Hand Hole	1	.....	1	Each	30.00	30.00
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	1,626	.....	1,626	Lin. Ft.	1.40	2,276.40
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	53	.....	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	126	.....	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	.....	.....	.....	Lbs.	0.12	.....
47	Stone or Gravel for Foundations	266	.....	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	472	124	596	Lin. Ft.	325.00	193,700.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
51	Ventilation Buildings—West and East Bldgs., Complete	38%	2%	40%	Lump Sum	$40,000.00	136,000.00
52	Ventilation Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	160,000.00	.....
53	Mechanical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	60,000.00	.....
54	Electrical Equipment—Furn. and Install. Complete	5%	0.8%	5.8%	Lump Sum	$10,000.00	12,180.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	878,773.04
Deductions—25% of Work Done	.....
Deduction—$100,000	100,000.00
Deduction—10% of Work Done	.....
Total Due to Date	778,773.04
Previous Payments	718,947.34
Balance Due on This Estimate	59,825.70

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held June 10, 1935.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From May 1, 1935 to May 31, 1935

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Twelve
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	733,420	1,090	734,510	Cu. Yds.	$ 0.33	242,388.30
2	Overhaul	2,326,708	45,840	2,372,548	Sta. Yds.	0.005	11,862.74
3	Structural Excavation—Class "A"	33,951	1,619	35,570	Cu. Yds.	1.20	42,684.00
4	Structural Excavation—Class "B"	263	5	268	Cu. Yds.	2.00	536.00
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	1,661,365	75,000	1,736,365	Lbs.	0.04	69,454.60
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	9,136	315	9,451	Cu. Yds.	15.50	146,490.50
9	Concrete Structures—Class "B" Concrete	975	66	1,041	Cu. Yds.	14.50	15,094.50
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.06	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	.....	.....	.....	Each	19.00	.....
20	Corrugated Metal Pipe Culvert—8 Inch	98	.....	98	Lin. Ft.	1.30	127.40
21	Corrugated Metal Pipe Culvert—12 Inch	136	.....	136	Lin. Ft.	2.00	272.00
22	Corrugated Metal Pipe Culvert—18 Inch	438	.....	438	Lin. Ft.	3.00	1,314.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	48	.....	48	Lin. Ft.	1.20	57.60
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	553	.....	553	Lin. Ft.	1.50	829.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	.....	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	.....	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	.....	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	215	.....	215	Lin. Ft.	1.00	215.00
30	Vitrified Pipe Sewers—8 Inch	57	.....	57	Lin. Ft.	1.20	68.40
31	Manholes—Standard Tops	7	.....	7	Each	90.00	630.00
32	Manholes—Inlet Tops	2	.....	2	Each	100.00	200.00
33	Manholes—Grating Tops	3	.....	3	Each	90.00	270.00
34	Storm Water Inlets—24 Inch Openings	.....	.....	.....	Each	75.00	.....
35	Storm Water Inlets—"B"	2	.....	2	Each	100.00	200.00
36	Storm Water Inlets—"C"	3	.....	3	Each	80.00	240.00
37	Lamp Holes—6 Inch	1	.....	1	Each	24.00	24.00
38	Lamp Holes—8 Inch	.....	.....	.....	Each	26.00	.....
39	Lamp Holes—12 Inch	2	.....	2	Each	36.00	72.00
40	Hand Hole	1	.....	1	Each	30.00	30.00
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	1,626	.....	1,626	Lin. Ft.	1.40	2,276.40
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	53	.....	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	126	.....	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	266	.....	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	596	280	876	Lin. Ft.	325.00	284,700.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
51	Ventilation Buildings—West and East Bldgs., Complete	40%	4.3%	44.3%	Lump Sum	340,000.00	150,620.00
52	Ventilation Equipment—Furn. and Install. Complete	.....	3.2%	3.2%	Lump Sum	160,000.00	5,120.00
53	Mechanical Equipment—Furn. and Install. Complete	.....	.....	.....	Lump Sum	60,000.00	.....
54	Electrical Equipment—Furn. and Install. Complete	5.8%	1.6%	7.4%	Lump Sum	210,000.00	15,540.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	1,004,254.24
Deductions—25% of Work Done	.....
Deduction—$100,000	.....
Deduction—10% of Work Done	100,425.42
Total Due to Date	903,828.82
Previous Payments	778,773.04
Balance Due on This Estimate	125,055.78

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held July 9, 1935.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From June 1, 1935 to June 30, 1935

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Thirteen
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	734,510	25,500	760,010	Cu. Yds.	$ 0.33	250,803.30
2	Overhaul	2,372,548	103,700	2,476,248	Sta. Yds.	0.005	12,381.24
3	Structural Excavation—Class "A"	35,570	549	36,119	Cu. Yds.	1.20	43,342.80
4	Structural Excavation—Class "B"	268	.....	268	Cu. Yds.	2.00	536.00
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	1,736,365	66,000	1,802,365	Lbs.	0.04	72,094.60
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	9,451	296	9,747	Cu. Yds.	15.50	151,078.50
9	Concrete Structures—Class "B" Concrete	1,041	187	1,228	Cu. Yds.	14.50	17,806.00
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	.....	.....	Sq. Ft.	0.18	.....
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.08	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	.....	.....	Lin. Ft.	0.52	.....
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	.....	.....	Lin. Ft.	1.00	.....
17	Concrete Gutters	.....	.....	.....	Sq. Ft.	0.25	.....
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	.....	.....	.....	Each	12.00	.....
20	Corrugated Metal Pipe Culvert—8 Inch	98	.....	98	Lin. Ft.	1.30	127.40
21	Corrugated Metal Pipe Culvert—12 Inch	136	108	244	Lin. Ft.	2.00	488.00
22	Corrugated Metal Pipe Culvert—18 Inch	438	152	590	Lin. Ft.	3.00	1,770.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	48	.....	48	Lin. Ft.	1.20	57.60
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	553	.....	553	Lin. Ft.	1.50	829.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	.....	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	.....	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	.....	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	215	.....	215	Lin. Ft.	1.00	215.00
30	Vitrified Pipe Sewers—8 Inch	57	20	77	Lin. Ft.	1.20	92.40
31	Manholes—Standard Tops	7	1	8	Each	90.00	720.00
32	Manholes—Inlet Tops	2	.....	2	Each	100.00	200.00
33	Manholes—Grating Tops	3	.....	3	Each	90.00	270.00
34	Storm Water Inlets—34 Inch Openings	.....	.....	.....	Each	75.00	.....
35	Storm Water Inlets—"B"	2	.....	2	Each	100.00	200.00
36	Storm Water Inlets—"C"	3	.....	3	Each	80.00	240.00
37	Lamp Holes—6 Inch	1	.....	1	Each	24.00	24.00
38	Lamp Holes—8 Inch	.....	.....	.....	Each	26.00	.....
39	Lamp Holes—12 Inch	2	.....	2	Each	36.00	72.00
40	Hand Hole	1	.....	1	Each	30.00	30.00
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	1,626	.....	1,626	Lin. Ft.	1.40	2,276.40
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	53	.....	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	126	.....	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	266	.....	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	876	190	1,066	Lin. Ft.	325.00	346,450.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	.....	.....	.....	Lin. Ft.	40.00	.....
51	Ventilation Buildings—West and East Bldgs., Complete	44.3%	2.1%	46.4%	Lump Sum	$40,000.00	157,760.00
52	Ventilation Equipment—Furn. and Install. Complete	3.2%	3.9%	7.1%	Lump Sum	160,000.00	11,360.00
53	Mechanical Equipment—Furn. and Install. Complete	.....	6.7%	6.7%	Lump Sum	60,000.00	4,020.00
54	Electrical Equipment—Furn. and Install. Complete	7.4%	1.2%	8.6%	Lump Sum	210,000.00	18,060.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	1,106,242.04
Deductions—25% of Work Done	.....
Deduction—$100,000	.....
Deduction—10% of Work Done	110,624.20
Total Due to Date	995,617.84
Previous Payments	903,828.82
Balance Due on This Estimate	91,789.02

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held August 8, 1935.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From July 1, 1935 to July 31, 1935

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Fourteen
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	760,010	20,605	780,615	Cu. Yds.	$ 0.33	257,602.95
2	Overhaul	2,476,248	108,390	2,584,638	Sta. Yds.	0.005	12,923.19
3	Structural Excavation—Class "A"	36,119	49	36,168	Cu. Yds.	1.20	43,401.60
4	Structural Excavation—Class "B"	268	———	268	Cu. Yds.	2.00	536.00
5	Shoulders	———	———	———	Sq. Ft.	0.035	———
6	Reinforcing Steel	1,802,365	43,412	1,845,777	Lbs.	0.04	73,831.08
7	Structural Steel	———	———	———	Lbs.	0.05	———
8	Concrete Structures—Class "A" Concrete	9,747	106	9,853	Cu. Yds.	15.50	152,721.50
9	Concrete Structures—Class "B" Concrete	1,228	———	1,228	Cu. Yds.	14.50	17,806.00
10	Portland Cement Concrete Pavement—8 Inch	———	———	———	Sq. Ft.	0.24	———
11	Portland Cement Concrete Pavement—6 Inch	———	———	———	Sq. Ft.	0.18	———
12	Asphalt Concrete	———	———	———	Sq. Ft.	0.08	———
13	Penetration Oil Macadam Pavement	———	———	———	Sq. Ft.	0.14	———
14	Concrete Curbs—8 Inch	———	———	———	Lin. Ft.	0.52	———
15	Concrete Curbs—12 Inch	———	———	———	Lin. Ft.	0.80	———
16	Concrete Curbs—6 Inch with Guard	———	———	———	Lin. Ft.	1.00	———
17	Concrete Gutters	———	———	———	Sq. Ft.	0.25	———
18	Cement Sidewalks	———	———	———	Sq. Ft.	0.13	———
19	Fill Protectors	———	———	———	Each	19.00	———
20	Corrugated Metal Pipe Culvert—8 Inch	98	———	98	Lin. Ft.	1.30	127.40
21	Corrugated Metal Pipe Culvert—12 Inch	244	———	244	Lin. Ft.	2.00	488.00
22	Corrugated Metal Pipe Culvert—15 Inch	590	———	590	Lin. Ft.	3.00	1,770.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	48	———	48	Lin. Ft.	1.20	57.60
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	553	———	553	Lin. Ft.	1.50	829.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	———	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	———	———	———	Lin. Ft.	2.00	———
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	———	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	———	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	215	———	215	Lin. Ft.	1.00	215.00
30	Vitrified Pipe Sewers—8 Inch	77	138	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	8	2	10	Each	90.00	900.00
32	Manholes—Inlet Tops	2	1	3	Each	100.00	300.00
33	Manholes—Grating Tops	3	———	3	Each	90.00	270.00
34	Storm Water Inlets—34 Inch Openings	———	———	———	Each	75.00	———
35	Storm Water Inlets—"B"	2	———	2	Each	100.00	200.00
36	Storm Water Inlets—"C"	3	———	3	Each	80.00	240.00
37	Lamp Holes—6 Inch	1	———	1	Each	24.00	24.00
38	Lamp Holes—8 Inch	———	1	1	Each	26.00	26.00
39	Lamp Holes—12 Inch	2	———	2	Each	36.00	72.00
40	Hand Hole	1	———	1	Each	30.00	30.00
41	Underdrains—6 In. Perf. Corrug. Metal Pipe	1,626	———	1,626	Lin. Ft.	1.40	2,276.40
42	Piping Cast Iron—6 Inch	———	———	———	Lin. Ft.	1.50	———
43	Guard Rail	53	———	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	———	———	———	Lin. Ft.	3.00	———
45	Riprap	126	———	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	———	———	———	Lbs.	0.13	———
47	Stone or Gravel for Foundations	266	———	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	1,066	293	1,359	Lin. Ft.	325.00	441,675.00
49	Tunnel Construction—Type "B"	———	———	———	Lin. Ft.	400.00	———
50	Cross Adits	———	21	21	Lin. Ft.	40.00	840.00
51	Ventilation Buildings—West and East Bldgs., Complete	46.4%	7.6%	54%	Lump Sum	$40,000.00	183,600.00
52	Ventilation Equipment—Furn. and Install. Complete	7.1%	2.2%	9.3%	Lump Sum	160,000.00	14,880.00
53	Mechanical Equipment—Furn. and Install. Complete	6.7%	———	6.7%	Lump Sum	60,000.00	4,020.00
54	Electrical Equipment—Furn. and Install. Complete	8.6%	0.7%	9.3%	Lump Sum	210,000.00	19,530.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	———	———	———	Lump Sum	15,000.00	———

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved ———

Approved ———

Total Value of Work Done to Date	1,244,388.52
Deductions—25% of Work Done	———
Deduction—$100,000	———
Deduction—10% of Work Done	124,438.85
Total Due to Date	1,119,949.67
Previous Payments	995,617.84
Balance Due on This Estimate	124,331.83

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held September 10, 1935.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From August 1, 1935 to August 31, 1935

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Fifteen
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	780,615	.....	780,615	Cu. Yds.	$ 0.33	257,602.95
2	Overhaul	2,584,638	.....	2,584,638	Sta. Yds.	0.005	12,923.19
3	Structural Excavation—Class "A"	38,168	109	38,277	Cu. Yds.	1.20	45,932.40
4	Structural Excavation—Class "B"	268	.....	268	Cu. Yds.	2.00	536.00
5	Shoulders	.....	.....	.....	Sq. Ft.	0.035	.....
6	Reinforcing Steel	1,845,777	247,376	2,093,153	Lbs.	0.04	83,726.12
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	9,853	715	10,568	Cu. Yds.	15.50	163,804.00
9	Concrete Structures—Class "B" Concrete	1,228	.....	1,228	Cu. Yds.	14.50	17,806.00
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	.....	24,670	24,670	Sq. Ft.	0.18	4,440.60
12	Asphalt Concrete	.....	.....	.....	Sq. Ft.	0.06	.....
13	Penetration Oil Macadam Pavement	.....	.....	.....	Sq. Ft.	0.14	.....
14	Concrete Curbs—6 Inch	.....	2,240	2,240	Lin. Ft.	0.52	1,164.80
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	.....	40	40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	.....	2,280	2,280	Sq. Ft.	0.25	570.00
18	Cement Sidewalks	.....	.....	.....	Sq. Ft.	0.13	.....
19	Fill Protectors	.....	.....	.....	Each	19.00	.....
20	Corrugated Metal Pipe Culvert—8 Inch	98	.....	98	Lin. Ft.	1.30	127.40
21	Corrugated Metal Pipe Culvert—12 Inch	244	.....	244	Lin. Ft.	2.00	488.00
22	Corrugated Metal Pipe Culvert—18 Inch	590	.....	590	Lin. Ft.	3.00	1,770.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	48	.....	48	Lin. Ft.	1.20	57.60
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	553	200	753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	.....	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	.....	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	.....	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	215	17	232	Lin. Ft.	1.00	232.00
30	Vitrified Pipe Sewers—8 Inch	215	.....	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10	.....	10	Each	90.00	900.00
32	Manholes—Inlet Tops	3	1	4	Each	100.00	400.00
33	Manholes—Grating Tops	3	.....	3	Each	90.00	270.00
34	Storm Water Inlets—24 Inch Openings	.....	1	1	Each	75.00	75.00
35	Storm Water Inlets—"B"	2	.....	2	Each	100.00	200.00
36	Storm Water Inlets—"C"	3	.....	3	Each	80.00	240.00
37	Lamp Holes—6 Inch	1	1	2	Each	24.00	48.00
38	Lamp Holes—8 Inch	1	.....	1	Each	26.00	26.00
39	Lamp Holes—12 Inch	2	1	3	Each	36.00	108.00
40	Hand Hole	1	.....	1	Each	30.00	30.00
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	1,626	402	2,028	Lin. Ft.	1.40	2,839.20
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	53	.....	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	.....	.....	.....	Lin. Ft.	3.00	.....
45	Riprap	126	.....	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	266	.....	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	1,359	211	1,570	Lin. Ft.	325.00	510,250.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	21	38	59	Lin. Ft.	40.00	2,360.00
51	Ventilation Buildings—West and East Bldgs., Complete	54%	7.3%	61.3%	Lump Sum	$40,000.00	208,420.00
52	Ventilation Equipment—Furn. and Install. Complete	9.3%	1.2%	10.5%	Lump Sum	160,000.00	16,800.00
53	Mechanical Equipment—Furn. and Install. Complete	6.7%	.....	6.7%	Lump Sum	60,000.00	4,020.00
54	Electrical Equipment—Furn. and Install. Complete	9.3%	1.1%	10.4%	Lump Sum	210,000.00	21,840.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	1,374,372.06
Deductions—25% of Work Done	.....
Deduction—$100,000	.....
Deduction—10% of Work Done	137,437.21
Total Due to Date	1,236,934.85
Previous Payments	1,119,949.67
Balance Due on This Estimate	116,985.18

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

446

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held October 9, 1935.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From September 1, 1935 to September 30, 1935

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Sixteen
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	780,615	3,600	784,215	Cu. Yds.	$ 0.33	258,790.95
2	Overhaul	2,584,638	———	2,584,638	Sta. Yds.	0.005	12,923.19
3	Structural Excavation—Class "A" #38,277-2,000	36,277	61	36,338	Cu. Yds.	1.20	43,605.60
4	Structural Excavation—Class "B"	268	———	268	Cu. Yds.	2.00	536.00
5	Shoulders	———	———	———	Sq. Ft.	0.035	———
6	Reinforcing Steel	2,093,153	128,369	2,221,522	Lbs.	0.04	88,860.88
7	Structural Steel	———	———	———	Lbs.	0.05	———
8	Concrete Structures—Class "A" Concrete	10,568	233	10,801	Cu. Yds.	15.50	167,415.50
9	Concrete Structures—Class "B" Concrete	1,228	———	1,228	Cu. Yds.	14.50	17,806.00
10	Portland Cement Concrete Pavement—8 Inch	———	———	———	Sq. Ft.	0.24	———
11	Portland Cement Concrete Pavement—6 Inch	24,670	6,431	31,101	Sq. Ft.	0.18	5,598.18
12	Asphalt Concrete	———	40,000	40,000	Sq. Ft.	0.08	3,290.00
13	Penetration Oil Macadam Pavement	———	———	———	Sq. Ft.	0.14	———
14	Concrete Curbs—6 Inch	2,240	1,012	3,252	Lin. Ft.	0.52	1,691.04
15	Concrete Curbs—12 Inch	———	———	———	Lin. Ft.	0.80	———
16	Concrete Curbs—6 Inch with Guard	40	———	40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	2,280	1,552	3,832	Sq. Ft.	0.25	958.00
18	Cement Sidewalks	———	———	———	Sq. Ft.	0.13	———
19	Fill Protectors	———	———	———	Each	19.00	———
20	Corrugated Metal Pipe Culvert—8 Inch	98	———	98	Lin. Ft.	1.30	127.40
21	Corrugated Metal Pipe Culvert—12 Inch	244	94	338	Lin. Ft.	2.00	676.00
22	Corrugated Metal Pipe Culvert—18 Inch	590	———	590	Lin. Ft.	3.00	1,770.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	48	50	98	Lin. Ft.	1.20	117.60
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	753	———	753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	———	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	———	———	———	Lin. Ft.	2.00	———
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	———	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	———	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	232	———	232	Lin. Ft.	1.00	232.00
30	Vitrified Pipe Sewers—8 Inch	215	———	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10	———	10	Each	90.00	900.00
32	Manholes—Inlet Tops	4	———	4	Each	100.00	400.00
33	Manholes—Grating Tops	3	———	3	Each	90.00	270.00
34	Storm Water Inlets—24 Inch Openings	1	———	1	Each	75.00	75.00
35	Storm Water Inlets—"B"	2	2	4	Each	100.00	400.00
36	Storm Water Inlets—"C"	3	———	3	Each	80.00	240.00
37	Lamp Holes—6 Inch	2	———	2	Each	24.00	48.00
38	Lamp Holes—8 Inch	1	———	1	Each	26.00	26.00
39	Lamp Holes—12 Inch	3	———	3	Each	36.00	108.00
40	Hand Hole	1	———	1	Each	30.00	30.00
41	Underdrains—6 In. Perf. Corrug. Metal Pipe	2,028	———	2,028	Lin. Ft.	1.40	2,839.20
42	Piping Cast Iron—6 Inch	———	———	———	Lin. Ft.	1.50	———
43	Guard Rail	53	———	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	———	———	———	Lin. Ft.	3.00	———
45	Riprap	126	———	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	———	———	———	Lbs.	0.13	———
47	Stone or Gravel for Foundations	266	———	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	1,570	72	1,642	Lin. Ft.	325.00	533,650.00
49	Tunnel Construction—Type "B"	———	———	———	Lin. Ft.	400.00	———
50	Cross Adits	59	———	59	Lin. Ft.	40.00	2,360.00
51	Ventilation Buildings—West and East Bldgs., Complete	61.3%	3.4%	64.7%	Lump Sum	340,000.00	219,980.00
52	Ventilation Equipment—Furn. and Install. Complete	10.5%	0.5%	11.0%	Lump Sum	160,000.00	17,600.00
53	Mechanical Equipment—Furn. and Install. Complete	6.7%	———	6.7%	Lump Sum	60,000.00	4,020.00
54	Electrical Equipment—Furn. and Install. Complete	10.4%	2.0%	12.4%	Lump Sum	210,000.00	26,040.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	———	———	———	Lump Sum	15,000.00	———

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	1,427,659.34
Deductions—85% of Work Done	———
Deduction—$100,000	———
Deduction—10% of Work Done	142,765.93
Total Due to Date	1,284,893.41
Previous Payments	1,236,934.85
Balance Due on This Estimate	47,958.56

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

#To correct Estimate No. Fifteen

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held November 9, 1935.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From Oct. 1, 1935 to Oct. 31, 1935

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Seventeen
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	784,215	16,046	800,261	Cu. Yds.	$ 0.33	264,086.13
2	Overhaul	2,584,638	52,272	2,636,910	Sta. Yds.	0.005	13,184.55
3	Structural Excavation—Class "A"	36,338	128	36,466	Cu. Yds.	1.20	43,759.20
4	Structural Excavation—Class "B"	268	———	268	Cu. Yds.	2.00	536.00
5	Shoulders	———	———	———	Sq. Ft.	0.035	———
6	Reinforcing Steel	2,221,522	300,000	2,521,522	Lbs.	0.04	100,860.88
7	Structural Steel	———	———	———	Lbs.	0.05	———
8	Concrete Structures—Class "A" Concrete	10,801	149	10,950	Cu. Yds.	15.50	169,725.00
9	Concrete Structures—Class "B" Concrete	1,228	———	1,228	Cu. Yds.	14.50	17,806.00
10	Portland Cement Concrete Pavement—8 Inch	———	———	———	Sq. Ft.	0.24	———
11	Portland Cement Concrete Pavement—6 Inch	31,101	———	31,101	Sq. Ft.	0.18	5,598.18
12	Asphalt Concrete	40,000	———	40,000	Sq. Ft.	0.08	3,200.00
13	Penetration Oil Macadam Pavement	———	80,000	80,000	Sq. Ft.	0.14	11,200.00
14	Concrete Curbs—6 Inch	3,252	———	3,252	Lin. Ft.	0.52	1,691.04
15	Concrete Curbs—12 Inch	———	———	———	Lin. Ft.	0.80	———
16	Concrete Curbs—6 Inch with Guard	40	———	40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	3,832	———	3,832	Sq. Ft.	0.25	958.00
18	Cement Sidewalks	———	———	———	Sq. Ft.	0.13	———
19	Fill Protectors	———	1	1	Each	19.00	19.00
20	Corrugated Metal Pipe Culvert—8 Inch	98	72	170	Lin. Ft.	1.30	221.00
21	Corrugated Metal Pipe Culvert—12 Inch	338	120	458	Lin. Ft.	2.00	916.00
22	Corrugated Metal Pipe Culvert—18 Inch	590	———	590	Lin. Ft.	3.00	1,770.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	98	56	154	Lin. Ft.	1.20	184.80
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	753	———	753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	———	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	———	———	———	Lin. Ft.	2.00	———
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	———	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	———	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	232	———	232	Lin. Ft.	1.00	232.00
30	Vitrified Pipe Sewers—8 Inch	215	———	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10	———	10	Each	90.00	900.00
32	Manholes—Inlet Tops	4	———	4	Each	100.00	400.00
33	Manholes—Grating Tops	3	———	3	Each	90.00	270.00
34	Storm Water Inlets—34 Inch Openings	1	———	1	Each	75.00	75.00
35	Storm Water Inlets—"B"	4	———	4	Each	100.00	400.00
36	Storm Water Inlets—"C"	3	1	4	Each	80.00	320.00
37	Lamp Holes—6 Inch	2	———	2	Each	24.00	48.00
38	Lamp Holes—8 Inch	1	———	1	Each	26.00	26.00
39	Lamp Holes—12 Inch	3	———	3	Each	36.00	108.00
40	Hand Hole	1	1	2	Each	30.00	60.00
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	2,028	———	2,028	Lin. Ft.	1.40	2,839.20
42	Piping Cast Iron—6 Inch	———	———	———	Lin. Ft.	1.50	———
43	Guard Rail	53	———	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	———	———	———	Lin. Ft.	3.00	———
45	Riprap	126	———	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	———	———	———	Lbs.	0.13	———
47	Stone or Gravel for Foundations	266	———	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	1,642	280	1,922	Lin. Ft.	325.00	624,650.00
49	Tunnel Construction—Type "B"	———	———	———	Lin. Ft.	400.00	———
50	Cross Adits	59	———	59	Lin. Ft.	40.00	2,360.00
51	Ventilation Buildings—West and East Bldgs., Complete	64.7%	13.4%	78.1%	Lump Sum	340,000.00	265,540.00
52	Ventilation Equipment—Furn. and Install. Complete	11%	0.2%	11.2%	Lump Sum	160,000.00	17,920.00
53	Mechanical Equipment—Furn. and Install. Complete	6.7%	———	6.7%	Lump Sum	60,000.00	4,020.00
54	Electrical Equipment—Furn. and Install. Complete	12.4%	3.6%	16%	Lump Sum	210,000.00	33,600.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	———	———	———	Lump Sum	15,000.00	———

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	1,603,848.78
Deductions—25% of Work Done	———
Deduction—$100,000	———
Deduction—10% of Work Done	160,384.88
Total Due to Date	1,443,463.90
Previous Payments	1,284,893.41
Balance Due on This Estimate	158,570.49

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held December 9, 1935.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Eighteen
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

From November 1, 1935 to November 30, 1935

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	800,261	———	800,261	Cu. Yds.	$ 0.33	264,086.13
2	Overhaul	2,636,910	———	2,636,910	Sta. Yds.	0.005	13,184.55
3	Structural Excavation—Class "A"	36,466	285	36,751	Cu. Yds.	1.20	44,101.20
4	Structural Excavation—Class "B"	268	———	268	Cu. Yds.	2.00	536.00
5	Shoulders	———	———	———	Sq. Ft.	0.035	———
6	Reinforcing Steel	2,521,522	214,628	2,736,150	Lbs.	0.04	109,446.00
7	Structural Steel	———	———	———	Lbs.	0.05	———
8	Concrete Structures—Class "A" Concrete	10,950	252	11,202	Cu. Yds.	15.50	173,631.00
9	Concrete Structures—Class "B" Concrete	1,228	———	1,228	Cu. Yds.	14.50	17,806.00
10	Portland Cement Concrete Pavement—8 Inch	———	———	———	Sq. Ft.	0.24	———
11	Portland Cement Concrete Pavement—6 Inch	31,101	———	31,101	Sq. Ft.	0.18	5,598.18
12	Asphalt Concrete	40,000	2,609	42,609	Sq. Ft.	0.08	3,408.72
13	Penetration Oil Macadam Pavement	80,000	———	80,000	Sq. Ft.	0.14	11,200.00
14	Concrete Curbs—6 Inch	3,252	———	3,252	Lin. Ft.	0.52	1,691.04
15	Concrete Curbs—12 Inch	———	———	———	Lin. Ft.	0.80	———
16	Concrete Curbs—6 Inch with Guard	40	———	40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	3,832	———	3,832	Sq. Ft.	0.25	958.00
18	Cement Sidewalks	———	7,000	7,000	Sq. Ft.	0.13	910.00
19	Fill Protectors	1	1	2	Each	19.00	38.00
20	Corrugated Metal Pipe Culvert—8 Inch	170	220	390	Lin. Ft.	1.30	507.00
21	Corrugated Metal Pipe Culvert—12 Inch	458	10	468	Lin. Ft.	2.00	936.00
22	Corrugated Metal Pipe Culvert—18 Inch	590	456	1,046	Lin. Ft.	3.00	3,138.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	154	———	154	Lin. Ft.	1.20	184.80
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	753	———	753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	———	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	———	———	———	Lin. Ft.	2.00	———
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	———	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	———	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	232	———	232	Lin. Ft.	1.00	232.00
30	Vitrified Pipe Sewers—8 Inch	215	———	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10	———	10	Each	90.00	900.00
32	Manholes—Inlet Tops	4	———	4	Each	100.00	400.00
33	Manholes—Grating Tops	3	———	3	Each	90.00	270.00
34	Storm Water Inlets—34 Inch Openings	1	———	1	Each	75.00	75.00
35	Storm Water Inlets—"B"	4	———	4	Each	100.00	400.00
36	Storm Water Inlets—"C"	4	1	5	Each	80.00	400.00
37	Lamp Holes—6 Inch	2	———	2	Each	24.00	48.00
38	Lamp Holes—8 Inch	1	———	1	Each	26.00	26.00
39	Lamp Holes—12 Inch	3	———	3	Each	36.00	108.00
40	Hand Hole	2	———	2	Each	30.00	60.00
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	2,028	170	2,198	Lin. Ft.	1.40	3,077.20
42	Piping Cast Iron—6 Inch	———	———	———	Lin. Ft.	1.50	———
43	Guard Rail	53	———	53	Lin. Ft.	0.80	42.40
44	Pipe Hand Rail	———	313	313	Lin. Ft.	3.00	939.00
45	Riprap	126	———	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	———	———	———	Lbs.	0.13	———
47	Stone or Gravel for Foundations	266	———	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	1,922	231	2,153	Lin. Ft.	325.00	699,725.00
49	Tunnel Construction—Type "B"	———	———	———	Lin. Ft.	400.00	———
50	Cross Adits	59	38	97	Lin. Ft.	40.00	3,880.00
51	Ventilation Buildings—West and East Bldgs., Complete	78.1%	3.9%	82%	Lump Sum	340,000.00	278,800.00
52	Ventilation Equipment—Furn. and Install. Complete	11.2%	0.4%	11.6%	Lump Sum	160,000.00	18,560.00
53	Mechanical Equipment—Furn. and Install. Complete	6.7%	———	6.7%	Lump Sum	60,000.00	4,020.00
54	Electrical Equipment—Furn. and Install. Complete	16%	0.2%	16.2%	Lump Sum	210,000.00	34,020.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	———	———	———	Lump Sum	15,000.00	———

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	1,711,665.62
Deductions—95% of Work Done	———
Deduction—$100,000	———
Deduction—10% of Work Done	171,166.56
Total Due to Date	1,540,499.06
Previous Payments	1,443,463.90
Balance Due on This Estimate	97,035.16

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held January 9, 1936.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From December 1, 1935 to December 31, 1935

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Nineteen
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	800,261	4,814	805,075	Cu. Yds.	$ 0.33	265,674.75
2	Overhaul	2,636,910	500,000	3,136,910	Sta. Yds.	0.005	15,684.56
3	Structural Excavation—Class "A"	36,751	108	36,859	Cu. Yds.	1.20	44,230.80
4	Structural Excavation—Class "B"	268	.....	268	Cu. Yds.	2.00	536.00
5	Shoulders	.....	5,400	5,400	Sq. Ft.	0.035	189.00
6	Reinforcing Steel	2,736,150	151,167	2,887,317	Lbs.	0.04	115,492.68
7	Structural Steel	.....	.....	.....	Lbs.	0.05	.....
8	Concrete Structures—Class "A" Concrete	11,202	138	11,340	Cu. Yds.	15.50	175,770.00
9	Concrete Structures—Class "B" Concrete	1,228	.....	1,228	Cu. Yds.	14.50	17,806.00
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	31,101	.....	31,101	Sq. Ft.	0.18	5,598.18
12	Asphalt Concrete	42,609	.....	42,609	Sq. Ft.	0.08	3,406.72
13	Penetration Oil Macadam Pavement	80,000	.....	80,000	Sq. Ft.	0.14	11,200.00
14	Concrete Curbs—6 Inch	3,252	.....	3,252	Lin. Ft.	0.52	1,691.04
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	40	.....	40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	3,832	.....	3,832	Sq. Ft.	0.25	958.00
18	Cement Sidewalks	7,000	2,000	9,000	Sq. Ft.	0.13	1,170.00
19	Fill Protectors	2	2	4	Each	19.00	76.00
20	Corrugated Metal Pipe Culvert—8 Inch	390	206	596	Lin. Ft.	1.30	774.80
21	Corrugated Metal Pipe Culvert—12 Inch	468	.....	468	Lin. Ft.	2.00	936.00
22	Corrugated Metal Pipe Culvert—18 Inch	1,046	.....	1,046	Lin. Ft.	3.00	3,138.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	154	.....	154	Lin. Ft.	1.20	184.80
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	753	.....	753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	.....	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	.....	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	.....	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	232	.....	232	Lin. Ft.	1.00	232.00
30	Vitrified Pipe Sewers—8 Inch	215	.....	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10	.....	10	Each	90.00	900.00
32	Manholes—Inlet Tops	4	.....	4	Each	100.00	400.00
33	Manholes—Grating Tops	3	.....	3	Each	90.00	270.00
34	Storm Water Inlets—34 Inch Openings	1	.....	1	Each	75.00	75.00
35	Storm Water Inlets—"B"	4	.....	4	Each	100.00	400.00
36	Storm Water Inlets—"C"	5	2	7	Each	80.00	560.00
37	Lamp Holes—6 Inch	2	.....	2	Each	24.00	48.00
38	Lamp Holes—8 Inch	1	.....	1	Each	26.00	26.00
39	Lamp Holes—12 Inch	3	.....	3	Each	36.00	108.00
40	Hand Hole	2	.....	2	Each	30.00	60.00
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	2,198	.....	2,198	Lin. Ft.	1.40	3,077.20
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	53	600	653	Lin. Ft.	0.80	522.40
44	Pipe Hand Rail	313	.....	313	Lin. Ft.	3.00	939.00
45	Riprap	126	.....	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	266	.....	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	2,153	157	2,310	Lin. Ft.	325.00	750,750.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	97	.....	97	Lin. Ft.	40.00	3,880.00
51	Ventilation Buildings—West and East Bldgs., Complete	82%	1.9%	83.9%	Lump Sum	340,000.00	285,260.00
52	Ventilation Equipment—Furn. and Install. Complete	11.6%	.....	11.6%	Lump Sum	160,000.00	18,560.00
53	Mechanical Equipment—Furn. and Install. Complete	6.7%	.....	6.7%	Lump Sum	60,000.00	4,020.00
54	Electrical Equipment—Furn. and Install. Complete	16.2%	0.5%	16.7%	Lump Sum	210,000.00	35,070.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	1,783,999.32
Deductions—25% of Work Done	.....
Deduction—$100,000	.....
Deduction—10% of Work Done	178,399.93
Total Due to Date	1,605,599.69
Previous Payments	1,540,499.06
Balance Due on This Estimate	65,100.63

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held February 7, 1936.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From Jan. 1, 1936 to Jan. 31, 1936

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Twenty
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	805,075	———	805,075	Cu. Yds.	$ 0.33	$265,674.75
2	Overhaul	3,136,910	217,778	3,354,688	Sta. Yds.	0.005	16,773.44
3	Structural Excavation—Class "A"	36,859	———	36,859	Cu. Yds.	1.20	44,230.80
4	Structural Excavation—Class "B"	268	———	268	Cu. Yds.	2.00	536.00
5	Shoulders	5,400	———	5,400	Sq. Ft.	0.035	189.00
6	Reinforcing Steel	2,887,317	75,490	2,962,807	Lbs.	0.04	118,512.28
7	Structural Steel	———	———	———	Lbs.	0.05	———
8	Concrete Structures—Class "A" Concrete	11,340	———	11,340	Cu. Yds.	15.50	175,770.00
9	Concrete Structures—Class "B" Concrete	1,228	———	1,228	Cu. Yds.	14.50	17,806.00
10	Portland Cement Concrete Pavement—8 Inch	———	———	———	Sq. Ft.	0.24	———
11	Portland Cement Concrete Pavement—6 Inch	31,101	———	31,101	Sq. Ft.	0.18	5,598.18
12	Asphalt Concrete	42,609	———	42,609	Sq. Ft.	0.08	3,408.72
13	Penetration Oil Macadam Pavement	80,000	———	80,000	Sq. Ft.	0.14	11,200.00
14	Concrete Curbs—6 Inch	3,252	———	3,252	Lin. Ft.	0.52	1,691.04
15	Concrete Curbs—12 Inch	———	———	———	Lin. Ft.	0.80	———
16	Concrete Curbs—6 Inch with Guard	40	———	40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	3,832	———	3,832	Sq. Ft.	0.25	958.00
18	Cement Sidewalks	9,000	———	9,000	Sq. Ft.	0.13	1,170.00
19	Fill Protectors	4	2	6	Each	19.00	114.00
20	Corrugated Metal Pipe Culvert—8 Inch	596	120	716	Lin. Ft.	1.30	930.80
21	Corrugated Metal Pipe Culvert—12 Inch	468	———	468	Lin. Ft.	2.00	936.00
22	Corrugated Metal Pipe Culvert—18 Inch	1,046	———	1,046	Lin. Ft.	3.00	3,138.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	154	———	154	Lin. Ft.	1.20	184.80
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	753	———	753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	———	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	———	———	———	Lin. Ft.	2.00	———
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	———	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	———	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	232	———	232	Lin. Ft.	1.00	232.00
30	Vitrified Pipe Sewers—8 Inch	215	———	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10	———	10	Each	90.00	900.00
32	Manholes—Inlet Tops	4	———	4	Each	100.00	400.00
33	Manholes—Grating Tops	3	———	3	Each	90.00	270.00
34	Storm Water Inlets—34 Inch Openings	1	———	1	Each	75.00	75.00
35	Storm Water Inlets—"B"	4	———	4	Each	100.00	400.00
36	Storm Water Inlets—"C"	7	1	8	Each	80.00	640.00
37	Lamp Holes—6 Inch	2	———	2	Each	24.00	48.00
38	Lamp Holes—8 Inch	1	———	1	Each	26.00	26.00
39	Lamp Holes—12 Inch	3	———	3	Each	36.00	108.00
40	Hand Hole	2	———	2	Each	30.00	60.00
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	2,198	———	2,198	Lin. Ft.	1.40	3,077.20
42	Piping Cast Iron—6 Inch	———	———	———	Lin. Ft.	1.50	———
43	Guard Rail	653	———	653	Lin. Ft.	0.80	522.40
44	Pipe Hand Rail	313	———	313	Lin. Ft.	3.00	939.00
45	Riprap	126	———	126	Cu. Yds.	5.00	630.00
46	Metal Cribbing	———	———	———	Lbs.	0.13	———
47	Stone or Gravel for Foundations	266	———	266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	2,310	229	2,539	Lin. Ft.	325.00	825,175.00
49	Tunnel Construction—Type "B"	———	———	———	Lin. Ft.	400.00	———
50	Cross Adits	97	———	97	Lin. Ft.	40.00	3,880.00
51	Ventilation Buildings—West and East Bldgs., Complete	83.9%	1.9%	85.8%	Lump Sum	$340,000.00	291,720.00
52	Ventilation Equipment—Furn. and Install. Complete	11.6%	0.1%	11.7%	Lump Sum	160,000.00	18,720.00
53	Mechanical Equipment—Furn. and Install. Complete	6.7%	———	6.7%	Lump Sum	60,000.00	4,020.00
54	Electrical Equipment—Furn. and Install. Complete	16.7%	0.1%	16.8%	Lump Sum	210,000.00	35,280.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	———	———	———	Lump Sum	15,000.00	———

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved ———

Approved ———

Total Value of Work Done to Date	1,869,636.81
Deductions—25% of Work Done	———
Deduction—$100,000	———
Deduction—10% of Work Done	186,963.68
Total Due to Date	1,682,673.13
Previous Payments	1,605,599.39
Balance Due on This Estimate	77,073.74

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held March 10, 1936.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From February 1, 1936 to February 29, 1936

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Twenty-one
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	805,075		805,075	Cu. Yds.	$ 0.33	265,674.75
2	Overhaul	3,354,688	287,287	3,641,975	Sta. Yds.	0.005	18,209.88
3	Structural Excavation—Class "A"	36,859		36,859	Cu. Yds.	1.20	44,230.80
4	Structural Excavation—Class "B"	268		268	Cu. Yds.	2.00	536.00
5	Shoulders	5,400		5,400	Sq. Ft.	0.035	189.00
6	Reinforcing Steel	2,962,807	88,759	3,051,566	Lbs.	0.04	122,062.64
7	Structural Steel				Lbs.	0.05	
8	Concrete Structures—Class "A" Concrete	11,340		11,340	Cu. Yds.	15.50	175,770.00
9	Concrete Structures—Class "B" Concrete	1,228		1,228	Cu. Yds.	14.50	17,806.00
10	Portland Cement Concrete Pavement—8 Inch				Sq. Ft.	0.24	
11	Portland Cement Concrete Pavement—6 Inch	31,101		31,101	Sq. Ft.	0.18	5,598.18
12	Asphalt Concrete	42,609		42,609	Sq. Ft.	0.08	3,408.72
13	Penetration Oil Macadam Pavement	80,000		80,000	Sq. Ft.	0.14	11,200.00
14	Concrete Curbs—6 Inch	3,252		3,252	Lin. Ft.	0.52	1,691.04
15	Concrete Curbs—12 Inch				Lin. Ft.	0.80	
16	Concrete Curbs—6 Inch with Guard	40		40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	3,832		3,832	Sq. Ft.	0.25	958.00
18	Cement Sidewalks	9,000		9,000	Sq. Ft.	0.13	1,170.00
19	Fill Protectors	6		6	Each	19.00	114.00
20	Corrugated Metal Pipe Culvert—8 Inch	716		716	Lin. Ft.	1.30	930.80
21	Corrugated Metal Pipe Culvert—12 Inch	468		468	Lin. Ft.	2.00	936.00
22	Corrugated Metal Pipe Culvert—18 Inch	1,046		1,046	Lin. Ft.	3.00	3,138.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	154		154	Lin. Ft.	1.20	184.80
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	753		753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395		395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"				Lin. Ft.	2.00	
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326		1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579		579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	232		232	Lin. Ft.	1.00	232.00
30	Vitrified Pipe Sewers—8 Inch	215		215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10		10	Each	90.00	900.00
32	Manholes—Inlet Tops	4		4	Each	100.00	400.00
33	Manholes—Grating Tops	3		3	Each	90.00	270.00
34	Storm Water Inlets—34 Inch Openings	1		1	Each	75.00	75.00
35	Storm Water Inlets—"B"	4		4	Each	100.00	400.00
36	Storm Water Inlets—"C"	8		8	Each	80.00	640.00
37	Lamp Holes—6 Inch	2		2	Each	24.00	48.00
38	Lamp Holes—8 Inch	1		1	Each	26.00	26.00
39	Lamp Holes—12 Inch	3		3	Each	36.00	108.00
40	Hand Hole	2		2	Each	30.00	60.00
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	2,198		2,198	Lin. Ft.	1.40	3,077.20
42	Piping Cast Iron—6 Inch				Lin. Ft.	1.50	
43	Guard Rail	653		653	Lin. Ft.	0.80	522.40
44	Pipe Hand Rail	313		313	Lin. Ft.	3.00	939.00
45	Riprap	126		126	Cu. Yds.	5.00	630.00
46	Metal Cribbing				Lbs.	0.13	
47	Stone or Gravel for Foundations	266		266	Cu. Yds.	3.00	798.00
48	Tunnel Construction—Type "A"	2,539	242	2,781	Lin. Ft.	325.00	903,825.00
49	Tunnel Construction—Type "B"				Lin. Ft.	400.00	
50	Cross Adits	97		97	Lin. Ft.	40.00	3,880.00
51	Ventilation Buildings—West and East Bldgs., Complete	85.8%	1.5%	87.3%	Lump Sum	$40,000.00	296,820.00
52	Ventilation Equipment—Furn. and Install. Complete	11.7%		11.7%	Lump Sum	160,000.00	18,720.00
53	Mechanical Equipment—Furn. and Install. Complete	6.7%		6.7%	Lump Sum	60,000.00	4,020.00
54	Electrical Equipment—Furn. and Install. Complete	16.8%		16.8%	Lump Sum	210,000.00	35,280.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete				Lump Sum	15,000.00	

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved

Approved

Total Value of Work Done to Date	1,958,373.61
Deductions—5% of Work Done	
Deduction—$100,000	
Deduction—10% of Work Done	193,837.36
Total Due to Date	1,762,536.25
Previous Payments	1,682,673.13
Balance Due on This Estimate	79,863.12

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held April 9, 1936.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From March 1, 1936 to March 31, 1936

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Twenty-two
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	805,075	———	805,075	Cu. Yds.	$ 0.33	265,674.75
2	Overhaul	3,641,975	73,968	3,715,943	Sta. Yds.	0.005	18,579.78
3	Structural Excavation—Class "A"	36,859	89	36,948	Cu. Yds.	1.20	44,337.60
4	Structural Excavation—Class "B"	268	93	361	Cu. Yds.	2.00	722.00
5	Shoulders	5,400	———	5,400	Sq. Ft.	0.035	189.00
6	Reinforcing Steel	3,051,566	109,070	3,160,636	Lbs.	0.04	126,425.44
7	Structural Steel	———	138,619	138,619	Lbs.	0.05	6,930.95
8	Concrete Structures—Class "A" Concrete	11,340	508	11,848	Cu. Yds.	15.50	133,644.00
9	Concrete Structures—Class "B" Concrete	———	———	———	Cu. Yds.	14.50	17,734.95
10	Portland Cement Concrete Pavement—8 Inch	1,228	-4.9	1,223.1	Sq. Ft.	0.24	———
11	Portland Cement Concrete Pavement—6 Inch	31,101	———	31,101	Sq. Ft.	0.18	5,598.18
12	Asphalt Concrete	42,609	———	42,609	Sq. Ft.	0.08	3,408 72
13	Penetration Oil Macadam Pavement	80,000	———	80,000	Sq. Ft.	0.14	11,200.00
14	Concrete Curbs—6 Inch	3,252	———	3,252	Lin. Ft.	0.52	1,691.04
15	Concrete Curbs—12 Inch	———	———	———	Lin. Ft.	0.80	———
16	Concrete Curbs—6 Inch with Guard	40	———	40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	3,832	———	3,832	Sq. Ft.	0.25	958.00
18	Cement Sidewalks	9,000	———	9,000	Sq. Ft.	0.13	1,170.00
19	Fill Protectors	6	———	6	Each	19.00	114.00
20	Corrugated Metal Pipe Culvert—8 Inch	716	20	736	Lin. Ft.	1.30	956.80
21	Corrugated Metal Pipe Culvert—12 Inch	468	———	468	Lin. Ft.	2.00	936.00
22	Corrugated Metal Pipe Culvert—18 Inch	1,046	———	1,046	Lin. Ft.	3.00	3,138.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	154	———	154	Lin. Ft.	1.20	184.80
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	753	———	753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	———	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	———	———	———	Lin. Ft.	2.00	———
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	———	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	———	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	232	3	235	Lin. Ft.	1.00	235.00
30	Vitrified Pipe Sewers—8 Inch	215	———	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10	———	10	Each	90.00	900.00
32	Manholes—Inlet Tops	4	———	4	Each	100.00	400.00
33	Manholes—Grating Tops	3	———	3	Each	90.00	270.00
34	Storm Water Inlets—24 Inch Openings	1	———	1	Each	75.00	75.00
35	Storm Water Inlets—"B"	4	———	4	Each	100.00	400.00
36	Storm Water Inlets—"C"	8	———	8	Each	80.00	640.00
37	Lamp Holes—6 Inch	2	———	2	Each	24.00	48.00
38	Lamp Holes—8 Inch	1	———	1	Each	26.00	26.00
39	Lamp Holes—12 Inch	3	———	3	Each	36.00	108.00
40	Hand Hole	2	———	2	Each	30.00	60.00
41	Underdrains—6 In. Perf. Corrug. Metal Pipe	2,198	160	2,358	Lin. Ft.	1.40	3,301.20
42	Piping Cast Iron—6 Inch	———	———	———	Lin. Ft.	1.50	———
43	Guard Rail	653	———	653	Lin. Ft.	0.80	522.40
44	Pipe Hand Rail	313	198	511	Lin. Ft.	3.00	1,533.00
45	Riprap	126	2	128	Cu. Yds.	5.00	640.00
46	Metal Cribbing	———	———	———	Lbs.	0.13	———
47	Stone or Gravel for Foundations	266	33	299	Cu. Yds.	3.00	897.00
48	Tunnel Construction—Type "A"	2,781	174	2,955	Lin. Ft.	325.00	960,375.00
49	Tunnel Construction—Type "B"	———	———	———	Lin. Ft.	400.00	———
50	Cross Adits	97	96	193	Lin. Ft.	40.00	7,720.00
51	Ventilation Buildings—West and East Bldgs., Complete	87.3%	0.8%	88.1%	Lump Sum	$40,000.00	299,540.00
52	Ventilation Equipment—Furn. and Install. Complete	11.7%	27.6%	39.3%	Lump Sum	160,000.00	62,880.00
53	Mechanical Equipment—Furn. and Install. Complete	6.7%	———	6.7%	Lump Sum	60,000.00	4,020.00
54	Electrical Equipment—Furn. and Install. Complete	16.8%	0.2%	17.0%	Lump Sum	$10,000.00	35,700.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	———	———	———	Lump Sum	15,000.00	———

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved ———

Approved ———

Total Value of Work Done to Date	$2,086,778.95
Deductions—5% of Work Done	———
Deduction—$100,000	———
Deduction—10% of Work Done	208,677.90
Total Due to Date	1,878,101.05
Previous Payments	$1,762,536.25
Balance Due on This Estimate	115,584.80

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

459

DEFENDANT'S EXHIBIT XXX (Continued)

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held May 7, 1936.

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From April 1, 1936 to April 30, 1936

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Twenty-three
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	805,075	960	806,035	Cu. Yds.	$ 0.33	265,991.55
2	Overhaul	3,715,943	507,381	4,223,324	Sta. Yds.	0.005	21,116.62
3	Structural Excavation—Class "A"	36,948	407	37,355	Cu. Yds.	1.20	44,826.00
4	Structural Excavation—Class "B"	361	———	361	Cu. Yds.	2.00	722.00
5	Shoulders	5,400	———	5,400	Sq. Ft.	0.035	189.00
6	Reinforcing Steel	3,160,636	135,370	3,296,006	Lbs.	0.04	131,840.24
7	Structural Steel	138,619	124,757	263,376	Lbs.	0.05	13,168.80
8	Concrete Structures—Class "A" Concrete	11,848	450	12,298	Cu. Yds.	15.50	190,619.00
9	Concrete Structures—Class "B" Concrete	1,223.1	———	1,223.1	Cu. Yds.	14.50	17,734.95
10	Portland Cement Concrete Pavement—8 Inch	———	———	———	Sq. Ft.	0.24	———
11	Portland Cement Concrete Pavement—6 Inch	31,101	———	31,101	Sq. Ft.	0.18	5,598.18
12	Asphalt Concrete	42,609	———	42,609	Sq. Ft.	0.08	3,408.72
13	Penetration Oil Macadam Pavement	80,000	———	80,000	Sq. Ft.	0.14	11,200.00
14	Concrete Curbs—6 Inch	3,252	———	3,252	Lin. Ft.	0.52	1,691.04
15	Concrete Curbs—12 Inch	———	———	———	Lin. Ft.	0.80	———
16	Concrete Curbs—6 Inch with Guard	40	———	40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	3,832	———	3,832	Sq. Ft.	0.25	958.00
18	Cement Sidewalks	9,000	———	9,000	Sq. Ft.	0.13	1,170.00
19	Fill Protectors	6	———	6	Each	19.00	114.00
20	Corrugated Metal Pipe Culvert—8 Inch	736	———	736	Lin. Ft.	1.30	956.80
21	Corrugated Metal Pipe Culvert—12 Inch	468	———	468	Lin. Ft.	2.00	936.00
22	Corrugated Metal Pipe Culvert—18 Inch	1,046	———	1,046	Lin. Ft.	3.00	3,138.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	154	———	154	Lin. Ft.	1.20	184.80
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	753	———	753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	———	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	———	———	———	Lin. Ft.	2.00	———
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	———	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	———	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	235	———	235	Lin. Ft.	1.00	235.00
30	Vitrified Pipe Sewers—8 Inch	215	———	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10	———	10	Each	90.00	900.00
32	Manholes—Inlet Tops	4	———	4	Each	100.00	400.00
33	Manholes—Grating Tops	3	———	3	Each	90.00	270.00
34	Storm Water Inlets—24 Inch Openings	1	———	1	Each	75.00	75.00
35	Storm Water Inlets—"B"	4	———	4	Each	100.00	400.00
36	Storm Water Inlets—"C"	8	———	8	Each	80.00	640.00
37	Lamp Holes—6 Inch	2	———	2	Each	24.00	48.00
38	Lamp Holes—8 Inch	1	———	1	Each	26.00	26.00
39	Lamp Holes—12 Inch	3	———	3	Each	36.00	108.00
40	Hand Hole	2	———	2	Each	30.00	60.00
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	2,358	108	2,466	Lin. Ft.	1.40	3,452.40
42	Piping Cast Iron—6 Inch	———	———	———	Lin. Ft.	1.50	———
43	Guard Rail	653	———	653	Lin. Ft.	0.80	522.40
44	Pipe Hand Rail	511	———	511	Lin. Ft.	3.00	1,533.00
45	Riprap	128	———	128	Cu. Yds.	5.00	640.00
46	Metal Cribbing	———	———	———	Lbs.	0.13	———
47	Stone or Gravel for Foundations	299	36	335	Cu. Yds.	3.00	1,005.00
48	Tunnel Construction—Type "A"	2,955	356	3,311	Lin. Ft.	325.00	1,075,075.00
49	Tunnel Construction—Type "B"	———	———	———	Lin. Ft.	400.00	———
50	Cross Adits	193	6	199	Lin. Ft.	40.00	7,960.00
51	Ventilation Buildings—West and East Bldgs., Complete	88.1%	1.3%	89.4%	Lump Sum	340,000.00	303,960.00
52	Ventilation Equipment—Furn. and Install. Complete	39.3%	8.5%	47.8%	Lump Sum	160,000.00	76,480.00
53	Mechanical Equipment—Furn. and Install. Complete	6.7%	3.0%	9.7%	Lump Sum	60,000.00	5,820.00
54	Electrical Equipment—Furn. and Install., Complete	17.0%	0.4%	17.4%	Lump Sum	210,000.00	36,540.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	———	———	———	Lump Sum	15,000.00	———

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved_____

Approved_____

Total Value of Work Done to Date	$2,245,607.90
Deductions—25% of Work Done	———
Deduction—$100,000	———
Deduction—10% of Work Done	224,560.79
Total Due to Date	2,021,047.11
Previous Payments	1,878,101.05
Balance Due on This Estimate	$ 142,946.06

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT YYY

June 10, 1936

File: Broadway Tunnel
Estimate No. 24
Six Companies of California,
P. O. Box 120,
Berkeley, California.

Gentlemen:

Enclosed please find our check in amount $148,-586.98, in payment of Estimate No. 24.

A copy of Estimate No. 24 is also enclosed.

Yours very truly,
JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
By (signed) JOHN R. HUNTER
Comptroller

JRH/VE
Encs.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. No. YYY. Filed April 28, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From May 1, 1936 to May 31, 1936

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Twenty-four
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	806,035	997	807,032	Cu. Yds.	$ 0.33	266,320.56
2	Overhaul	4,223,324	221,000	4,444,324	Sta. Yds.	0.005	22,221.62
3	Structural Excavation—Class "A"	37,355	137	37,492	Cu. Yds.	1.20	44,990.40
4	Structural Excavation—Class "B"	361	.....	361	Cu. Yds.	2.00	722.00
5	Shoulders	5,400	.....	5,400	Sq. Ft.	0.035	189.00
6	Reinforcing Steel	3,296,006	280,893	3,576,899	Lbs.	0.04	143,075.96
7	Structural Steel	263,376	.....	263,376	Lbs.	0.05	13,168.80
8	Concrete Structures—Class "A" Concrete	12,298	272	12,570	Cu. Yds.	15.50	194,835.00
9	Concrete Structures—Class "B" Concrete	1,223.1	.....	1,223.1	Cu. Yds.	14.50	17,734.95
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.24	.....
11	Portland Cement Concrete Pavement—6 Inch	31,101	.....	31,101	Sq. Ft.	0.18	5,598.18
12	Asphalt Concrete	42,609	.....	42,609	Sq. Ft.	0.08	3,408.72
13	Penetration Oil Macadam Pavement	80,000	.....	80,000	Sq. Ft.	0.14	11,200.00
14	Concrete Curbs—6 Inch	3,252	.....	3,252	Lin. Ft.	0.52	1,691.04
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	40	.....	40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	3,832	.....	3,832	Sq. Ft.	0.25	958.00
18	Cement Sidewalks	9,000	.....	9,000	Sq. Ft.	0.13	1,170.00
19	Fill Protectors	6	.....	6	Each	19.00	114.00
20	Corrugated Metal Pipe Culvert—8 Inch	736	.....	736	Lin. Ft.	1.30	956.80
21	Corrugated Metal Pipe Culvert—12 Inch	468	10	478	Lin. Ft.	2.00	956.00
22	Corrugated Metal Pipe Culvert—15 Inch	1,046	.....	1,046	Lin. Ft.	3.00	3,138.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	154	.....	154	Lin. Ft.	1.20	184.80
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	753	.....	753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	.....	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	.....	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	.....	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	235	.....	235	Lin. Ft.	1.00	235.00
30	Vitrified Pipe Sewers—8 Inch	215	.....	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10	.....	10	Each	90.00	900.00
32	Manholes—Inlet Tops	4	.....	4	Each	100.00	400.00
33	Manholes—Grating Tops	3	.....	3	Each	90.00	270.00
34	Storm Water Inlets—34 Inch Openings	1	.....	1	Each	75.00	75.00
35	Storm Water Inlets—"B"	4	.....	4	Each	100.00	400.00
36	Storm Water Inlets—"C"	8	.....	8	Each	80.00	640.00
37	Lamp Holes—6 Inch	2	.....	2	Each	24.00	48.00
38	Lamp Holes—8 Inch	1	.....	1	Each	26.00	26.00
39	Lamp Holes—12 Inch	3	.....	3	Each	36.00	108.00
40	Hand Hole	2	.....	2	Each	30.00	60.00
41	Underdrains—6 In. Perf. Corrug. Metal Pipe	2,466	536	3,002	Lin. Ft.	1.40	4,202.80
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	653	.....	653	Lin. Ft.	0.80	522.40
44	Pipe Hand Rail	511	98	609	Lin. Ft.	3.00	1,827.00
45	Riprap	128	.....	128	Cu. Yds.	5.00	640.00
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	335	2	337	Cu. Yds.	3.00	1,011.00
48	Tunnel Construction—Type "A"	3,311	435	3,746	Lin. Ft.	325.00	1,217,450.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	199	.....	199	Lin. Ft.	40.00	7,960.00
51	Ventilation Buildings—West and East Bldgs., Complete	89.4%	.....	89.4%	Lump Sum	340,000.00	303,960.00
52	Ventilation Equipment—Furn. and Install. Complete	47.8%	2.5%	50.3%	Lump Sum	160,000.00	80,480.00
53	Mechanical Equipment—Furn. and Install. Complete	9.7%	1.8%	11.5%	Lump Sum	60,000.00	6,900.00
54	Electrical Equipment—Furn. and Install. Complete	17.4%	2.1%	19.5%	Lump Sum	210,000.00	40,950.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by C. E. RIGGS

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date	$2,414,593.43
Deductions—10% of Work Done	241,459.34
Total Due to Date	2,173,134.09
Previous Payments	2,021,047.11
This Estimate	152,086.98
Deductions, Damages, Failure to Complete Within Contract Time, 7 Days at $500.00	3,500.00
Balance Due on This Estimate	$ 148,586.98

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

DEFENDANT'S EXHIBIT D-4

July 9, 1936

Six Companies of California,
1522 Latham Square Building,
Oakland, California.

Gentlemen:

Enclosed herewith please find Estimate No. 25 covering the period from June 1, 1936 to June 13, 1936, both dates inclusive, together with this District's check no. 2201 in your favor for the sum of $80,715.66 in payment of the amount due you on said estimate under the terms of your contract with the District dated June 4, 1934.

The District's check no. 1934 dated June 10, 1936, which was delivered to you on that date in payment of the amount due you under Estimate No. 24, which you returned to District with your letter of purported rescission dated June 13, 1936, is also enclosed and herewith tendered to you.

Yours very truly,
JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
By (signed) JOHN R. HUNTER
Comptroller

JRH:MC
Enc.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. No. D-4. Filed April 28, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT D-4

Filed With the Board of Directors of Joint Highway District No. 13 of the State of California at Meeting Held

HARRY M. STOW, Secretary
By L. V. EATON, Assistant Secretary

Estimate of Work

From June 1, 1936 to June 13, 1936

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA
1448 Webster Street
Oakland, Calif.

Estimate No. Twenty-five
Contractor—Six Companies of California, Inc.
Street—155 Sansome Street
City—San Francisco, Calif.

No.	Items	Total Quantities by Last Estimate	Estimate This Month	Total Quantities Estimated To Date	Units	Contract Prices	Amounts at Contract Prices
1	Grading	807,032	.....	807,032	Cu. Yds.	$ 0.33	266,320.56
2	Overhaul	4,444,324	141,948	4,586,272	Sta. Yds.	0.005	22,931.36
3	Structural Excavation—Class "A"	37,492	275	37,767	Cu. Yds.	1.20	45,320.40
4	Structural Excavation—Class "B"	361	.....	361	Cu. Yds.	2.00	722.00
5	Shoulders	5,400	.....	5,400	Sq. Ft.	0.035	189.00
6	Reinforcing Steel	3,576,899	163,050	3,739,949	Lbs.	0.04	149,597.96
7	Structural Steel	263,376	6,931	270,307	Lbs.	0.05	13,515.35
8	Concrete Structures—Class "A" Concrete	12,570	38	12,608	Cu. Yds.	15.50	195,424.00
9	Concrete Structures—Class "B" Concrete	1,223.1	.....	1,223.1	Cu. Yds.	14.50	17,734.95
10	Portland Cement Concrete Pavement—8 Inch	.....	.....	.....	Sq. Ft.	0.34	.....
11	Portland Cement Concrete Pavement—6 Inch	31,101	.....	31,101	Sq. Ft.	0.18	5,598.18
12	Asphalt Concrete	42,609	.....	42,609	Sq. Ft.	0.08	3,408.72
13	Penetration Oil Macadam Pavement	80,000	.....	80,000	Sq. Ft.	0.14	11,200.00
14	Concrete Curbs—6 Inch	3,252	139	3,391	Lin. Ft.	0.52	1,763.32
15	Concrete Curbs—12 Inch	.....	.....	.....	Lin. Ft.	0.80	.....
16	Concrete Curbs—6 Inch with Guard	40	.....	40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	3,832	10	3,842	Sq. Ft.	0.25	960.50
18	Cement Sidewalks	9,000	1,454	10,454	Sq. Ft.	0.13	1,359.02
19	Fill Protectors	6	.....	6	Each	19.00	114.00
20	Corrugated Metal Pipe Culvert—8 Inch	736	.....	736	Lin. Ft.	1.30	956.80
21	Corrugated Metal Pipe Culvert—12 Inch	478	.....	478	Lin. Ft.	2.00	956.00
22	Corrugated Metal Pipe Culvert—18 Inch	1,046	.....	1,046	Lin. Ft.	3.00	3,138.00
23	Reinforced Concrete Pipe Culvert—10 Inch "S"	154	.....	154	Lin. Ft.	1.20	184.80
24	Reinforced Concrete Pipe Culvert—12 Inch "S"	753	.....	753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 Inch "S"	395	.....	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 Inch "S"	.....	.....	.....	Lin. Ft.	2.00	.....
27	Reinforced Concrete Pipe Culvert—24 Inch "X"	1,326	.....	1,326	Lin. Ft.	4.40	5,834.40
28	Reinforced Concrete Pipe Culvert—36 Inch "X"	579	.....	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 Inch	235	.....	235	Lin. Ft.	1.00	235.00
30	Vitrified Pipe Sewers—8 Inch	215	.....	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10	.....	10	Each	90.00	900.00
32	Manholes—Inlet Tops	4	.....	4	Each	100.00	400.00
33	Manholes—Grating Tops	3	.....	3	Each	90.00	270.00
34	Storm Water Inlets—34 Inch Openings	1	.....	1	Each	75.00	75.00
35	Storm Water Inlets—"B"	4	.....	4	Each	100.00	400.00
36	Storm Water Inlets—"C"	8	.....	8	Each	80.00	640.00
37	Lamp Holes—6 Inch	2	.....	2	Each	24.00	48.00
38	Lamp Holes—8 Inch	1	.....	1	Each	26.00	26.00
39	Lamp Holes—12 Inch	3	.....	3	Each	36.00	108.00
40	Hand Hole	2	.....	2	Each	30.00	60.00
41	Underdrains—8 In. Perf. Corrug. Metal Pipe	3,002	358	3,360	Lin. Ft.	1.40	4,704.00
42	Piping Cast Iron—6 Inch	.....	.....	.....	Lin. Ft.	1.50	.....
43	Guard Rail	653	.....	653	Lin. Ft.	0.80	522.40
44	Pipe Hand Rail	609	.....	609	Lin. Ft.	3.00	1,827.00
45	Riprap	128	.....	128	Cu. Yds.	5.00	640.00
46	Metal Cribbing	.....	.....	.....	Lbs.	0.13	.....
47	Stone or Gravel for Foundations	337	.....	337	Cu. Yds.	3.00	1,011.00
48	Tunnel Construction—Type "A"	3,746	258.60	4,004.60	Lin. Ft.	325.00	1,301,495.00
49	Tunnel Construction—Type "B"	.....	.....	.....	Lin. Ft.	400.00	.....
50	Cross Adits	199	.....	199	Lin. Ft.	40.00	7,960.00
51	Ventilation Buildings—West and East Bldgs., Complete	89.4%	.....	89.4%	Lump Sum	340,000.00	303,960.00
52	Ventilation Equipment—Furn. and Install. Complete	50.3%	1.76%	52.06%	Lump Sum	160,000.00	83,296.00
53	Mechanical Equipment—Furn. and Install. Complete	11.5%	0.50%	12.00%	Lump Sum	60,000.00	7,200.00
54	Electrical Equipment—Furn. and Install. Complete	19.5%	0.23%	19.73%	Lump Sum	210,000.00	41,433.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	.....	.....	.....	Lump Sum	15,000.00	.....

Estimate Made by JOHN A. MORIN

Checked by A. S. GELSTON

Approved J. W. BARKLEY
Chief Asst. Engr.

Approved.....

Approved.....

Total Value of Work Done to Date		$2,511,499.72
Deductions—10% of Work Done	$251,149.97	
Deductions May 31 Estimate	3,500.00	
Deductions, Damages Failure to Complete Within Contract Time This Estimate 13 Days at $500	6,500.00	
	$261,149.97	261,149.97
		$2,250,349.75
Previous Payments		2,169,634.09
		$ 80,715.66

This Estimate Approved WALLACE B. BOGGS
District Engineer, Joint Highway District No. 13
of the State of California

Tightly Bound

DEFENDANT'S EX. O-4.

Grant Agreement, dated as of March 9, 1934, between Joint Highway District No. 13 of the State of California (herein called the "First Party"), and the United States of America (herein called the "Second Party").

Whereas, the Second Party, acting in conformity with Title II, National Industrial Recovery Act, (herein called the "Act"), approved June 16, 1933, is authorized and empowered to grant to any State, Municipality or other public body not in excess of 30 per centum of the cost of the labor and materials employed upon any public works project of any such State, municipality or other public body when such project has been included in the comprehensive program prepared pursuant to Section 202 of the Act; and

Whereas, the First Party has duly filed with the Second Party an application (Docket Number 2231) for a Grant to aid in financing the construction of the highway improvements described in Paragraph 2, Part One (herein called the "Project"), to be owned and operated by the First Party; and

Whereas, the First Party has represented that it (a) has full power to and will undertake and complete the Project; (b) will provide from lawful sources, funds, which, together with the amount to be represented by the Grant, will be sufficient to pay all costs thereof; and (c) will apply such Grant

solely to the cost of constructing the Project; and

Whereas, with a view to increasing employment quickly, and to aid said First Party in financing the Project, upon the foregoing representations, said Project has been included in said comprehensive program:

Now, therefore, the First Party and the Second Party hereby agree:

Part One

PROCEDURE AND GENERAL PROVISIONS

1. Amount, Use and Purpose. Subject to the terms and conditions set forth below, the Second Party will grant to the First Party an amount not to exceed 30 per centum of the cost of the labor and materials employed upon the Project, (such amount being herein called the "Grant"), but in no event to exceed in the aggregate $1,095,000. The First Party will accept the Grant, and will construct the Project in accordance with plans and specifications submitted to and approved by the Second Party, all pursuant to Title II of the Act, the rules and regulations adopted by the Second Party relative thereto, and the Constitution and Statutes of the State of California.

2. The Project. The Project (more fully described in the application of the First Party), to aid in the financing of which the Grant will be made, is substantially as follows: The construction of 2.82 miles of main highway, 40 feet wide, with asphaltic macadam surface on rock base, in-

cluding twin bore tunnels averaging 2,910 feet in length; 3 reinforced concrete overhead structure; 1 reinforced viaduct; 1 reinforced concrete railway grade separation structure; 2 portal buildings housing ventilation equipment; and retaining walls and drainage facilities; all with such minor alterations or modifications thereof or additions thereto as may from time to time, be approved by the Second Party before or during the course of construction.

3. Preliminary Proceedings by First Party. Promptly after receipt from the Second Party of an unexecuted copy of this Agreement, the First Party will;

(a) Adopt a resolution approving this Agreement, and authorizing and directing the execution and delivery thereof by the officials designated to sign the same on its behalf;

(b) Send to the Second Party complete extracts from the minutes of the meetings of the First Party's governing body showing all proceedings taken incident to such authorization, including a copy of said resolution, all duly certified, and three signed copies of this Agreement;

(c) Commence all necessary proceedings, if any, to authorize the construction of the Project, and to obtain funds, which, together with the amount to be represented by the Grant, will be sufficient to pay all the costs of constructing the Project. The term "cost of constructing the Project", as used in this Agreement, shall include all costs of acquir-

ing all necessary lands, easements, franchises, and rights-of-way necessary to the completion and operation of the Project;

(d) Apply for all necessary authorizations, permits, licenses and approvals from Federal, State, county, municipal and other authorities for the construction of the Project;

(e) Submit to the Second Party plans, drawings, and specifications of the work and materials called for by all contracts let, or proposed to be let; the latest data as to the expected cost of the Project; a statement as to when and how it is proposed to advertise for bids and to let contracts for work; forms of bids, and copies of the advertisements thereof if heretofore advertised; a statement as to when it is proposed to acquire the necessary lands, easements, franchises, and rights-of-way; and any other details or data that may be requested by the Second Party's engineers.

4. Construction of Project. On or before the date of the execution by the Second Party of this Agreement, the First Party may, and within such time thereafter, as shall be satisfactory to the Second Party, the First Party will commence or cause to be commenced the construction of the Project and will thereafter continue the same with all practicable dispatch, in an efficient and economical manner, at a reasonable cost, and in accordance with plans, drawings, specifications and construction contracts which shall be in form and substance as approved by the Second Party, and in accord-

ance with such engineering supervision and inspection as the Second Party or its representatives may require. Except with the prior written consent of the Second Party, no materials or equipment for the Project shall be purchased by the First Party subject to any chattel mortgage or to any conditional sale or title retention agreement.

5. Completion of Proceedings. As soon as practicable after the execution by the Second Party of this Agreement, the First Party will complete all necessary proceedings and procure all necessary authorizations, permits, licenses, and approvals referred to in Paragraph 3 (c) and (d), Part One, hereof; will obtain the necessary funds, or will take appropriate proceedings to legally obtain the necessary funds, which, together with the amount to be represented by the Grant, will be sufficient to pay all costs of constructing the Project; and will lawfully acquire all lands, easements, franchises, and rights-of-way necessary to the completion of the Project, and to put the Project in operation.

6. First Requisition. After the First Party shall have complied with the requirements of Paragraphs 3 and 5, Part One, hereof, and shall have expended not less than fifty per centum of the estimated cost of constructing the Project, the First Party may, at any time thereafter, file with the Second Party a requisition, requesting the Second Party to pay to the First Party, as provided in Paragraph 7, Part One, hereof, the first portion of the Grant, such requisition to be accompanied by:

(a) One certified copy of each necessary authorization, permit, license and approval from Federal, State, county, municipal and other authorities for the construction of the Project;

(b) A signed and dated opinion of the duly qualified and acting attorney of the First Party to the effect that the First Party has complied with all the requirements of Paragraph 5, Part One, hereof, and that all such proceedings are in accordance with the Constitution and Statutes of the State of California. Such opinion shall also state that the First Party has lawfully obtained and/or arranged to obtain the funds, which, together with the amount to be represented by the Grant, may be used lawfully to pay all costs of constructing the Project;

(c) A signed and dated affidavit of a duly authorized officer of the First Party, approved by the engineer or architect in responsible charge of construction of the Project, covering in such detail as the Second Party's engineers request:

(1) The purposes for which the First Party proposes to expend such portion of the Grant;

(2) An accounting for all deposits in and expenditures from the special account or accounts referred to in Paragraph 2, Part Three, hereof;

(3) The cost of the labor and materials employed upon the Project to the date thereof;

(4) The quantities of work actually completed to the date thereof;

(5) The amount of funds expended upon the Project to the date thereof; and

(6) The amount of funds expended to the date thereof for labor and materials employed upon the Project;

(d) A signed and dated no-litigation certificate of the duly qualified and acting attorney of the First Party; and

(e) A statement by each bank in which have been deposited, in the special account or accounts referred to in Paragraph 2, Part Three, hereof, the funds for the construction of the Project, showing all deposits made therein and the balance then remaining in each such special account.

The requisition and each of the documents accompanying same shall be in form and substance satisfactory to the Second Party, and, except for those described in Paragraph 6 (a) Part One, hereof, shall bear the same date.

7. First Payment. If such requisition and documents accompanying the same are satisfactory to the Second Party, then, subject to the terms and conditions of this Agreement, upon reasonable notice to the First Party, and within a reasonable time after the receipt by the Second Party of such requisition and other documents, (but not earlier than ten days after the receipt thereof, unless the Second Party shall waive such time limit), the Second Party will pay to the First Party an amount equal to twenty-five per centum of the total cost of the labor and materials employed upon the Project, as, in the opinion of the Second Party, is shown

in all statements theretofore approved by the Second Party. Such payment will be made at the Federal Reserve Bank of San Francisco, San Francisco, California, or at such other place or places as the Second Party may designate, against delivery by the First Party of its receipt therefor.

8. Intermediate Requisitions. From time to time after such first payment, but not oftener than once in thirty days, (unless otherwise satisfactory to the Second Party), the First Party may file requisitions with the Second Party, requesting the Second Party to make additional payments on account of the Grant, each such requisition to be accompanied by:

(a) Documents corresponding to those described in Paragraph 6 (b) and (d), Part One hereof;

(b) A signed and dated affidavit of a duly authorized officer of the First Party, approved by the engineer or architect in responsible charge of construction of the Project, covering in such detail as the Second Party's engineers may request:

(1) The purposes for which the First Party proposes to expend such portion of the Grant;

(2) An accounting for all expenditures theretofore made on the Project, in so far as such expenditures have not been previously so accounted for;

(3) The cost of the labor and materials employed upon the Project to the date thereof;

(4) The quantities of work actually completed to the date thereof;

(5) The quantities of work actually completed during each of the periods between all respective requisitions;

(6) The amount of funds expended upon the Project during each such period; and

(7) The amount of funds expended during each such period for labor and materials employed upon the Project;

(c) A statement by each bank in which have been deposited, in the special account or accounts referred to in Paragraph 2, Part Three, hereof, the funds (including any previous payments on account of the Grant) for the construction of the Project, showing the balance then remaining in each special account, provided no such statement need be submitted by any bank in which no such balance remains on deposit and which has previously so certified.

The requisition and each of the documents accompanying the same shall be in form and substance satisfactory to the Second Party and shall bear the same date.

9. Intermediate Payments. If such requisition and documents accompanying same are satisfactory to the Second Party, then, subject to the terms and conditions of this Agreement, upon reasonable notice to the First Party, and within reasonable time after receipt by the Second Party of such requisition and other documents, the Second Party

will pay to the First Party an amount equal to 25 per centum of the cost of the labor and materials employed upon the Project, not exceeding, however, with all previous payments on account of the Grant, an amount equal to 25 per centum of the total cost of such labor and materials as shown in the statements theretofore approved by the Second Party, but in no event, to exceed, together with all such previous payments, in the aggregate, the sum of $912,500. Each such payment shall be made at the place or places as hereinbefore provided for, against delivery by the First Party of its receipt therefor.

10. Final Requisition. When the Project has been completed and all costs in connection therewith have been determined, then the First Party may file the final requisition with the Second Party, requesting the Second Party to make the final payment on account of the Grant. Such requisition shall be accompanied by:

(a) Documents corresponding to those described in Paragraph 6 (b) and (d), and Paragraph 8 (c), Part One, hereof:

(b) An affidavit corresponding to that described in Paragraph 8 (b), Part One, hereof, which shall also be approved by the Government Engineer:

(c) An affidavit by the engineer or architect in responsible charge of construction of the Project, (which shall be approved by the Government Engineer), showing, among other things, and in such detail as shall be satisfactory to the Second Party;

(1) The quantities of work completed during each of the periods between the dates of each respective requisition;

(2) The cost of labor and materials employed upon the Project, the total cost of the Project, and separately, the amounts of such cost expended; and

(3) The completion of the Project in accordance with the plans and specifications therefor.

The term "Government Engineer" as used herein, shall mean the State Engineer (P.W.A.), or his duly authorized representative, or any person to whom his duties or functions may be transferred by the Federal Emergency Administration of Public Works, or its successors.

11. Final Payment. If such requisition and the documents accompanying the same are satisfactory to the Second Party, then, subject to the terms and conditions of this Agreement, upon reasonable notice to the First Party, and within a reasonable time after receipt by the Second Party of such requisition and other documents, the Second Party will pay to the First Party a sum of money, which, together with all payments theretofore made on account of the Grant, shall not exceed 30 per centum of the cost of labor and materials employed upon the Project, but in no event, to exceed, in the aggregate; together with all such previous payments, the sum of $1,095,000. Such final payment shall be made at the place or places as hereinbefore provided

for, against delivery by the First Party of its receipt therefor.

Part Two

CONSTRUCTION CONTRACTS.

In Consideration of the Grant the First Party Covenants That:

1. Construction Contracts. All construction contracts made by the First Party and all subcontracts for work on the Project shall be subject to the rules and regulations adopted by the Second Party to carry out the purposes and control the administration of the Act, and shall contain provisions appropriate to insure that:

(a) Convict Labor. No convict labor shall be employed on the Project, and no materials manufactured or produced by convict labor shall be used on the Project.

(b) 30-Hour Week. Except in executive, administrative and supervisory positions, so far as practicable and feasible in the judgment of the Second Party, no individual directly employed on the Project shall be permitted to work more than thirty hours in any one week, but in accordance with rules and regulations from time to time made by the Second Party, this provision shall be construed to permit working time lost because of inclement weather or unavoidable delays in any one week, to be made up in the succeeding twenty days.

(c) Wages.

(1) All employees shall be paid just and reasonable wages which shall be compensation sufficient to provide, for the hours of labor as limited, a standard of living in decency and comfort;

(2) All contracts and subcontracts shall further prescribe such minimum wage rates for skilled and unskilled labor as may be determined by the Second Party and shall be subject to all rules and regulations which the Second Party may promulgate in connection therewith. Such minimum rates, if any, shall also be stated in all proposals of bids submitted, including those of subcontractors; and a clearly legible statement of all wage rates to be paid the several classes of labor employed on the work shall be posted in a prominent and easily accessible place at the site of the work. All contractors shall keep a true and accurate report of the hours worked by and the wages paid to each employee and shall furnish the Second Party with sworn statements thereof on demand;

(3) All employees shall be paid in full not less often than once each week and in lawful money of the United States of America in the full amount accrued to each individual at the time of closing of the pay roll, which shall be at the latest date practicable prior to the date of payment, and there shall be no reduction on account of goods purchased, rent, or other obligations, but such obligations shall be subject to collection only by legal process.

(d) Labor Preferences. Preference shall be given, where they are qualified, to ex-service men

with dependents, and then in the following order:

(1) To citizens of the United States and aliens who have declared their intention of becoming citizens, who are bona fide residents of the County of Alameda or the County of Contra Costa, State of California; and

(2) To citizens of the United States and aliens who have declared their intention of becoming citizens, who are bona fide residents of the State of California, provided, that these preferences shall apply only where such labor is available and qualified to perform the work to which the employment relates.

(e) Employment Services. To the fullest extent possible, labor required for the Project and appropriate to be secured through employment services, shall be chosen from lists of qualified workers submitted by local employment agencies designated by the United States Employment Service; provided, however, that organized labor, skilled and unskilled, shall not be required to register at such local employment agencies but shall be secured in the customary ways through recognized union locals. In the event, however, that qualified workers are not furnished by the union locals within 48 hours (Sundays and holidays excluded) after request is filed by the employer, such labor may be chosen from lists of qualified workers submitted by local employment agencies designated by the United States Employment Service. In the selection of

workers from lists prepared by such employment agencies and union locals, the labor preferences provided in Paragraph 1 (d), Part Two, hereof, shall be observed in accordance with such rules and regulations as the Second Party may prescribe.

(f) Human Labor. In accordance with such rules and regulations as the Second Party may prescribe, the maximum of human labor shall be used in lieu of machinery wherever practicable and consistent with sound economy and public advantage; and to the extent that the work may be accomplished at no greater expense by human labor than by the use of machinery, and labor of requisite qualifications is available, such human labor shall be employed.

(g) Accident Prevention. Every construction contract for work on the Project shall contain an undertaking to comply with all applicable provisions of the laws and building construction codes of the State, Territory, District and/or municipality in which the work is done, and with any regulations for the protection of workers which may be promulgated by the Second Party.

(h) Compensation Insurance. Every construction contract for work on the Project shall contain a provision requiring the employer to furnish compensation insurance for injured workers and to give proof of such adequate insurance satisfactory to the Second Party.

(i) Persons Entitled to Benefits of Labor Provisions. Every person who performs the work of a laborer or of a mechanic on the Project, or any part thereof, shall be entitled to the benefits of the labor and wage provisions hereof, regardless of any contractual relationship between the contractor or subcontractor and such laborer or mechanic. There shall be no discrimination in the selection of labor on the ground of race, creed or color.

(j) Bonding of Contracts. Construction contracts shall be supported by adequate surety or other bonds or security satisfactory to the Second Party for the protection of labor and material-men employed on the Project or any part thereof.

(k) Materials. So far as articles, materials, and supplies produced in the United States are concerned, only articles, materials and supplies produced under codes of fair competition adopted pursuant to the provisions of Title I of the Act, or under the President's Reemployment Agreement, shall be used in work on the Project, except when the Second Party determines that this requirement is not in the public interest or that the consequent cost is unreasonable. So far as feasible and practicable, and subject to the above, preference shall be given to the use of locally produced materials, if such use does not involve higher cost, inferior quality, or insufficient quantity, subject to the determination of the Second Party; but there shall be no requirements providing price differentiations for

or restricting the use of materials to those produced within the Nation or State.

(l) Inspection and Records. The Second Party, through its authorized agents, shall have the right to inspect all work as it progresses and shall have access to all pay rolls, records of personnel, invoices of materials, and other data relevant to the performance of the contract.

(m) Reports. Subject to such rules and regulations as the Second Party may prescribe, contractors and subcontractors shall make reports in triplicate to the Second Party monthly within five days after the close of each calendar month on forms to be furnished by the United States Department of Labor, which reports shall include the number of persons on their pay rolls; the aggregate amount of the pay rolls; the man-hours worked; wage scales paid to various classes of labor; and the total expenditures for materials. The contractors shall also furnish to the Second Party the names and addresses of all subcontractors at the earliest dates practicable.

(n) Compliance With Title I of the Act. All contractors and subcontractors must comply with the conditions prescribed in Section 7 (a) (1) and Section 7 (a) (2) of Title I of the Act.

2. Restriction as to Contractors. No contract shall be let to any contractor or subcontractor who has not signed and complied with the applicable

approved code of fair competition adopted under Title I of the Act for the trade or industry or subdivision thereof concerned, or, if there be no such approved code, who has not signed and complied with the provisions of the President's Reemployment Agreement.

3. Termination for Breach. The First Party will enforce compliance with all provisions of this part of this Agreement, and, as to any work done by it in connection with the construction of the Project, will itself comply therewith. All construction contracts shall provide that if any such provisions are violated by any contractor or subcontractor, the First Party may with the approval of the Second Party, and shall at the request of the Second Party, terminate by written notice to the contractor or subcontractor, the contract of such contractor or subcontractor, and have the right to take over the work and prosecute the same to completion by contract or otherwise and such contractor or subcontractor and his sureties shall be liable for any excess cost occasioned thereby and/or, if so requested by the Second Party, the First Party shall withhold from such contractor or subcontractor so much of the compensation due to him as may be necessary to pay to laborers or mechanics the difference between the rate of wages required by the contract and the rate of wages actually paid to the laborers and mechanics.

4. Force Labor. Provided, however, that if prices in the bids are excessive, the First Party reserves the right, anything in this Agreement to the contrary notwithstanding, to apply to the Second Party for permission to do all or any part of the Project by day labor, upon such conditions as the Second Party may impose, with the understanding that all provisions in this Agreement, including those relating to labor, wages, hours and recruitment, shall be observed.

Part Three.

MISCELLANEOUS

1. Conditions Precedent to the Second Party's Obligations. The Second Party shall be under no obligation to make the Grant or any part thereof:

(a) Cost of Project. If the Second Party shall not be satisfied that the First Party will be able to construct the Project within the cost estimated at the time when the Grant was approved by it, unless, in the event that additional funds appear to the Second Party to be necessary in order to pay in full the cost of the construction of the Project, the Second Party shall be satisfied that the First Party will be able to obtain such funds, as needed, through additional borrowing or otherwise;

(b) Compliance. If the First Party shall not have complied, to the satisfaction of the Second Party, with all agreements and conditions contained

or referred to in this Agreement theretofore to be complied with by the First Party;

(c) Legal Matters. If the Second Party shall not be satisfied as to all legal matters and proceedings affecting the Project;

(d) Representations. If any representations made by the First Party in this Agreement or in the application for the Grant or any other data submitted by the First Party shall be found by the Second Party to be incorrect or incomplete in any material respect;

(e) Financial Condition. If, in the judgment of the Second Party, the financial condition of the First Party shall have changed unfavorably in a material degree from its condition as theretofore represented to the Second Party.

No waiver by the Second Party, express or implied, of any such condition shall constitute a waiver thereof as applied to any subsequent obligation of the Second Party under this Agreement.

2. Deposit of Proceeds. The First Party will deposit the Grant, and all funds which it has represented to the Second Party as on hand or hereafter available for the construction of the Project, in a bank or banks which are members of the Federal Reserve System, in a special account or accounts.

3. Disbursement of Proceeds. The First Party will expend the funds in such special account or accounts only in paying the cost of constructing the Project.

4. Information. During the construction of the Project, the First Party will furnish to the Second Party all such information and data as the Second Party's engineers may request as to the construction, cost and progress of the work.

5. Representations and Warranties. The First Party represents and warrants as follows:

(a) Authorization. All necessary authorization, permits, licenses and approvals from Federal, State, county, municipal and other authorities have been or will be obtained for the construction and operation of the Project.

(b) Litigation. No litigation or other proceedings are now pending or threatened which might adversely affect the powers and authority of the First Party in reference to the construction or financing of the Project, or the financial condition of the First Party.

(c) Fees and Commissions. No fee or commission has been or will be paid by the First Party or any of its officers, employees, agents or representatives, and no agreement to pay a fee or commission has been or will be entered into by or on behalf of the First Party or any of its officers, employees, agents or representatives, in order to secure the Grant hereunder.

(d) Affirmation. Every statement contained in this Agreement, in the application for a Grant, in any supplement thereto or amendment thereof, and any other data submitted or to be submitted to the

Second Party by or on behalf of the First Party is, or when so submitted will be, correct and complete, and no relevant fact materially affecting the Project or the financing thereof by the First Party has been or will be omitted therefrom.

6. Indemnification. The First Party will indemnify the Second Party against any loss or liability incurred by reason of any inaccuracy or incompleteness in any representation contained herein.

7. Use of Second Party's Name. Without the prior written consent of the Second Party, the First Party will not refer to this Agreement or to any Grant authorized or made hereunder as an inducement for the purchase of any securities of the First Party, and will not permit any purchaser from it of any such securities to do so.

8. Expenses. The First Party will pay all costs, charges and expenses incident to compliance with all the terms and conditions of this Agreement on its part to be complied with, including, without limiting the generality of the foregoing, the cost of preparing, executing and delivering to the Second Party all the documents required herein to be furnished by the First Party.

9. Supplemental Instruments. Upon request, the First Party will furnish such data, agreements and other instruments as the Second Party may deem necessary or desirable in connection with the performance of the obligations of the First Party under this Agreement.

10. Agreement Not for the Benefit of Third Parties. This Agreement is not for the benefit of any person or corporation other than the parties hereto.

11. Interest of Member of Congress. No Member of or Delegate to Congress shall be admitted to any share or part of this Agreement, or to any benefit to arise thereupon.

12. Miscellaneous. No rights of the First Party hereunder shall be assignable except with the prior written consent of the Second Party. All obligations of the First Party shall cease upon payment in full of all costs of constructing the Project. This Agreement contains the entire agreement between the parties, and shall be governed by and construed in accordance with the laws of the District of Columbia.

13. Undue Delay by the First Party. The Second Party shall have the right to rescind the allotment for the Project and annul any obligation to make a grant to the First Party unless the First Party shall within a reasonable time:

(a) Sign and return to the Second Party three copies of this Agreement; as provided in Paragraph 3, Part One hereof. (For the purposes of this subparagraph 13 (a) a reasonable time shall be deemed to be ten days in the ordinary course of events or such longer period as shall be allowed in the absolute discretion of the Federal Emergency Administrator of Public Works);

(b) Comply with all the provisions of Paragraph 4, Part One hereof.

The Federal Emergency Administrator of Public Works shall determine in his absolute discretion what constitutes a reasonable time within the meaning of this Paragraph 13.

In Witness Whereof, the First Party and the Second Party have respectively caused this Agreement to be duly executed as of the day and year first above written.

JOINT HIGHWAY DISTRICT No. 13 OF THE STATE OF CALIFORNIA.

[Seal] By THOMAS E. CALDECOTT,
President.

Attest:
HARRY M. STOW,
Secretary.

UNITED STATES OF AMERICA,
By HAROLD L. ICKES,
Federal Emergency Administrator of Public Works.

[Endorsed]: U. S. Dist. Ct. N. D. Cal., No. 20101-R. Defendant's Exhibit O-4. Filed May 26, 1938. Walter B. Maling, Clerk. J. A. Schaertzer, Deputy Clerk.

[Clerk's Note: Excerpt from stipulation of counsel re portions of record to be printed:

"(48). It is stipulated that an agreed statement of facts in the form hereto attached and marked 'Exhibit B' shall be printed in the record in lieu of defendant's exhibits X-1, X-2, X-4, to X-10 both inclusive, and X-12 to X-102, both inclusive."]

EXHIBIT "B"

AGREED STATEMENT OF FACTS PROVED BY DEFENDANT'S EXHIBITS X-1, X-2, X-4 TO X-10, BOTH INCLUSIVE, X-12 TO X-102, BOTH INCLUSIVE, WHICH EXHIBITS WERE OFFERED IN EVIDENCE BY DEFENDANT AND CROSS-COMPLAINANT AND RECEIVED IN EVIDENCE IN SUPPORT OF CROSS-COMPLAINT.

It Is Stipulated by and between all parties to this appeal that during the trial of the issues raised by the cross-complaint, defendant and cross-complainant offered and there was received in evidence defendant's exhibits Nos. X-1, X-2, X-4 to X-10, both inclusive, X-12 to X-102, both inclusive. These are formal documents, are lengthy and will greatly enlarge and encumber the record if included in the printed record on appeal.

It Is Further Stipulated that the printing of said exhibits may be omitted from the printed

record on appeal and this agreed statement of facts be printed in the record on appeal and considered in lieu thereof.

Said exhibits proved among other things the following facts:

After plaintiff ceased work on June 13, 1936, on the contract between plaintiff and defendant, and on August 17, 1936, the board of directors of defendant adopted a resolution approving a supplement to the specifications (Defs. Ex. X-3) describing the work then remaining to be done on the project of the District, which work had been left unfinished by plaintiff, which supplement made no change in the character or extent of the work from that required by the original contract between plaintiff and defendant, as applied to the then unfinished work. Said supplement was thereafter approved by the Director of the Department of Public Works of the State of California. Thereafter, after the adoption of a proper resolution by its board of directors, defendant advertised for the time and in the manner required by law for bids to be received on September 11, 1936, for a contract for the completion of its said project. No bids were submitted to defendant under its said call for bids.

On September 23, 1936, the board of directors of defendant adopted a resolution rescinding the supplement to the specifications approved August 17, 1936, and approved another supplement to the specifications (Defs. Ex. X-11) which described the un-

finished work and divided it into eight subdivisions called in said supplement Schedules A, B, C, D, E, F, G and H, and which provided for completing the work under eight separate contracts. The character and extent of the work to be done was not changed from that required by the original contract between plaintiff and defendant as applied to the unfinished work. Thereafter, said supplement was approved by the Director of the Department of Public Works of the State of California.

Defendant duly and regularly advertised for bids to complete the work specified in each of said schedules. Bids were received for performing the work included in each of said respective schedules and contracts were let accordingly in each case to the lowest responsible bidder respectively, one contract for each schedule of work. Defendant's Ex. X-11 was a part of each of said contracts and remained a part thereof until completion of same. The defendant paid the respective contractors under the respective schedules the amount specified in defendant's Ex. X-109. Thereafter the work was completed under each of said contracts and accepted by defendant. The work required to be done under said schedules collectively, was the identical work left unfinished by plaintiff when it ceased work on defendant's project on June 13, 1936; no new or additional work was included in any of the schedules or in any call for bids or in any new contract. All contracts were duly and regularly approved and

let in accordance with the law governing said District in the doing of public work.

The following is a tabulation showing in the various columns thereof the following facts:

Column 1. Title of schedule.

Column 2. Name of contractor for the schedule, to whom the contract was awarded, and who did the work on the schedule.

Column 3. Date on which contract was made between defendant and contractor named in Column 2.

Column 4. Date of actual completion of work.

Column 5. Amount or number of dollars deducted from contract price paid to contractor for the schedule as liquidated damages.

1. Schedule	2. Name of Contractor	3. Date of Letting Contract	4. Date of Completion	5. Liquidated Damages Deducted
A	Pollock & Clifford	Nov. 9, 1936	June 22, 1937	none
B	R. G. Clifford	Dec. 24, 1936	June 22, 1937	"
C	Fred K. Du Puy	Feb. 19, 1937	Nov. 27, 1937	$1[illegible],000
D	E. T. Lesure	Feb. 8, 1937	Dec. 1, 1937	none
E	Alta Electric & Mechanical Company, Inc.	Jan. 7, 1937	Dec. 1, 1937	"
F	Alta Electric & Mechanical Company, Inc.	Apr. 8, 1937	Sept. 4, 1937	"
G	Heafey-Moore Co.	Jan. 12, 1937	Nov. 9, 1937	"
H	Berkeley Steel Construction Company, Inc.	Apr. 30, 1937	Sept. 18, 1937	"

Of the above schedules, Schedule A was for the completion of excavation of tunnels and cross adit and completion of construction of concrete arch ring lining of tunnels and cross adit.

Schedule B was for the completion of grouting in the tunnels around the concrete ring which had been installed by plaintiff.

Schedule C was for the completion of tunnel construction remaining to be completed after concrete arch ring tunnel lining was constructed and grouting was completed.

Schedule D was for the completion of the ventilation buildings.

Schedule E was the completion of ventilation equipment, mechanical equipment and electrical equipment.

Schedule F was the furnishing and installation of carbon monoxide detectors and recorders.

Schedule G was the completion of highway construction and appurtenant structures.

Schedule H was for the construction and furnishing of certain steel structures.

It Is Further Stipulated that appellants and each of them by making this stipulation do not waive and shall not be considered as waiving any objections made at the trial or exceptions taken as to the admissibility of any such exhibits, nor do said appellants or any of them waive any defenses interposed to said cross-complaint.

The Parties Further Stipulate that if at any time during this appeal it should appear that the inspection of any of said original exhibits is necessary or desirable the court may examine such orig-

inals, all of which have been transmitted by the Clerk of the District Court to the Clerk of this Court. That if it further should appear that in order to comply with any rule of this court, or to properly determine this appeal, the whole or any portion of said exhibits to which this stipulation applies are required to be printed the appellant will forthwith print and furnish a supplemental record and file the same herein and cause all due and regular certification to be made thereto, and the said defendant and cross-complainant, the appellee herein, is not to be prejudiced in any way because of this stipulation or because it consents to the omission of the printing of said exhibits or any part thereof from the printed record.

DEFENDANT'S EXHIBIT X-3.

JOINT HIGHWAY DISTRICT No. 13.
OF THE
STATE OF CALIFORNIA.

SUPPLEMENT TO SPECIFICATIONS.

For Construction of Project of the District, Including Highway, Highway Tunnel and Approaches with Appurtenant Structures, Adopted March 30, 1933, as Amended and Supplemented by Amendments and Supplements to Said Specifications Adopted January 9, 1934 and April 3, 1934 Respectively.

WALLACE B. BOGGS,
District Engineer.

DIRECTORS

Thomas E. Caldecott.....President
Harry M. Stowe.....Secretary
Henry L. Hinman.....Treasurer

LEGAL.

Archibald B. Tinning.....Attorney

Adopted August 17, 1936.

Specification No.....
Set No.....

JOINT HIGHWAY DISTRICT No. 13 OF THE STATE OF CALIFORNIA.

Office of
WALLACE B. BOGGS,
District Engineer
1448 Webster Street,
Oakland California.

Adopted August 17, 1936.

Supplement to Specifications for Construction of Project of the District, Including Highway, Highway Tunnel and Approaches with Appurtenant Structures, Adopted March 30, 1933, as Amended and Supplemented by Amendments and Supplements to said Specifications Adopted January 9, 1934 and April 3, 1934 Respectively.

PART I. STATEMENT OF CONDITIONS.

A Contractor under contract with Joint Highway District No. 13 of the State of California abandoned work on the project of this District described in said Specifications on or about the 13th day of June, 1936, after performing part of the work described in the Plans and Specifications for said project, and left uncompleted the remainder of such work substantially as hereinafter described.

This Supplement to said Specifications describes the work remaining to be performed on the project

of the District. All of the said work remaining to be done is to be performed in accordance with the Plans and Specifications adopted by the Board of Directors of Joint Highway District No. 13 of the State of California on the 30th day of March, 1933, as amended and supplemented by amendments and supplements thereto adopted on January 9, 1934 and April 3, 1934, respectively, and with this supplement thereto and in strict compliance with all of the terms thereof; with the intent and purpose on the part of the Contractor and this District that the work shall be completed in every part, in every respect in accordance with the said Plans and Specifications.

The Contractor who undertakes the completion of said project shall do and perform and complete every part of the work described in said Plans and Specifications now remaining unperformed or partly completed, in order that the project shall be completed in each and every part, in accordance with said Plans and Specifications.

Prospective bidders shall examine the site of the work and all structures and parts of structures forming a part of the project and are required to satisfy themselves as to the conditions there existing, and the amount of work remaining to be done to complete the project.

The following description of the work is an approximation or estimate of the work remaining to be done and it is hereby declared and shall be

understood by all prospective bidders that the quantities set forth herein or on the Proposal Sheet, or Notice to Contractors, or in any Contract executed hereunder are approximate only, and are given as a basis for comparison of bids, and any Contractor whose proposal is accepted shall, by the terms of his contract with the District, guarantee to furnish all labor, materials, tools, and equipment necessary to the completion of all work on the project and to perform all work necessary or incidental to the construction of the portions of the project remaining to be completed as detailed, specified, and intended so as to furnish upon completion of said contract the completed project as required by the Plans and Specifications.

In order to provide a proper method for payment for the work of completing the project of the District which has been partially constructed as hereinabove mentioned, it has become necessary to provide in this supplement for a different method of payment for certain items of the work remaining to be performed, than was provided for respecting payment for said items in the Specifications heretofore adopted. Wherever, in this supplement, a basis for payment for any part of the work is provided which differs, conflicts, or is at variance with the basis of payment provided for in other parts of the Specifications, the basis for payment set forth in this supplement shall govern.

Joint Highway District No. 13 of the State of California reserves the right to increase or decrease

the amount of any part or portion of the work, or to omit such portions of the work as the District Engineer may deem it necessary or expedient to omit.

Wherever the words "Plans and Specifications" are herein used, the same shall be construed as meaning the Plans and Specifications for the Project of the District adopted by the Board of Directors of Joint Highway District No. 13 of the State of California on the 30th day of March, 1933, as amended and supplemented by the amendments and supplements thereto adopted January 9, 1934, and April 3, 1934, respectively, and by this supplement thereto.

PART II. TIME OF COMPLETION.

The entire work as described under Part III of this Supplement to the Specifications shall be completed within a period of two hundred fifty (250) calendar days from the date of execution of the contract therefor.

PART III. DESCRIPTION OF WORK REMAINING TO BE PERFORMED.

Section 1. Grading.

The work remaining to be done under "Grading" consists of the completion of the excavation and filling of the roadway prism to specified grade and cross section, the construction of drainage ditches, the removal of slides and disposing of

surplus material, and the performance of all necessary work as required by the Plans and Specifications.

It is estimated that there are approximately forty-five thousand (45,000) cubic yards of material remaining to be excavated.

Overhaul to be performed as specified is estimated to be approximately five hundred thousand (500,000) station yards.

Section 2. Excavation for Structures.

The work remaining to be done under "Excavation for Structures" consists of excavation for structures for which the excavations have not yet been made, or have not yet been completed, and the necessary backfilling thereof; also backfilling of all other structures at all points where such backfilling is not at present completed as required by the Plans and Specifications.

It is estimated that there are approximately seven hundred (700) cubic yards of excavation remaining.

Uncompleted backfilling is estimated to consist of approximately four hundred (400) cubic yards. No measurement will be made or separate payment allowed for backfilling. Full compensation for furnishing all materials, labor, tools, implements, equipment and supplies, and doing all work incidental to backfilling shall be considered as included in the price paid for "Excavation for Structures."

Section 3. Subgrade.

The work remaining to be done under "Subgrade" consists of the construction of the subgrade in all places designated as required by the Plans and Specifications where pavement has not yet been laid.

It is estimated that there are approximately seven hundred two thousand seven hundred (702,700) square feet of subgrade remaining to be constructed.

Section 4. Shoulders.

The work remaining to be done for completion of "Shoulders" consists of the construction of shoulders at locations designated in the Plans and Specifications where the same have not yet been constructed, and the completion of shoulders partly constructed, but not yet completed, as required by the Plans and Specifications.

It is estimated that there are approximately two hundred forty-five thousand (245,000) square feet of shoulders remaining to be constructed, and that there are approximately one thousand eight hundred (1,800) square feet of partially constructed shoulders to be completed by the Contractor as required by the Plans and Specifications.

Section 5. Reinforcing Steel.

The work remaining to be done consists of the furnishing and placing of "Reinforcing Steel" at all locations as required by the Plans and Specifications; and also includes the brushing and cleaning, straightening and otherwise adjusting to conform

to the Plans and Specifications of all reinforcing steel already placed, but about which concrete has not been placed, which has been exposed to the elements, and which has become rusted or coated with dirt or other foreign material, or bent or deformed, all to conform to the Plans and Specifications, and to provide reinforcing for the completed structure.

It is estimated that there are approximately eight hundred twenty-seven thousand (827,000) pounds of reinforcing steel remaining to be furnished and placed.

Section 6. Steel Structures.

The work remaining to be performed under "Steel Structures" consists of the furnishing and placing of the trusses, which support the louver frames, between the approach walls at the portals at each end of tunnel, and the furnishing and placing, in the tunnels, as required by the Plans and Specifications, of the structural steel which has not yet been installed.

It is estimated that there are approximately one hundred forty thousand (140,000) pounds of structural steel in the trusses.

It is estimated that there are approximately five hundred fifty-three thousand (553,000) pounds of structural steel to be furnished and placed in the tunnels.

Section 7. Concrete Structures

The work remaining to be done for completion of "Concrete Structures" consists of the construc-

tion, as required by the Plans and Specifications, of a retaining wall on the South side of the Service Roadway at the West Portal; coping structures at ends of Approach walls at East Portal, walls at Margarido Drive and Buena Vista place; parapet walls and rails on the Landvale Overhead structures, on Landvale Viaduct and walls, and on East Portal Approach walls.

It is estimated that there are approximately four hundred thirty (430) cubic yards of Class "A" concrete remaining to be placed in these structures. (Tunnel and building concrete remaining to be furnished and placed is described in Sections twenty-one (21) and twenty-two (22) of this Supplement.)

Section 8. Portland Cement Concrete Pavement

The work remaining to be done under "Portland Cement Concrete Pavement" consists of all of the eight inch (8") Portland cement concrete pavement at East and West Portals, as required by the Plans and Specifications.

It is estimated that there are approximately thirty-seven thousand seven hundred (37,700) square feet of eight inch (8") Portland cement concrete pavement remaining to be constructed. The six inch (6") Portland cement concrete pavement required by the Plans and Specifications has been completed.

Section 9. Penetration Oil Macadam Pavement

The work remaining to be done under "Penetra-

tion Oil Macadam Pavement" consists of the construction of all penetration oil macadam pavement as required by the Plans and Specifications which has not yet been constructed, and also includes repairs to previously completed penetration oil macadam pavement necessary to make the same conform to the requirements of the Plans and Specifications. Penetration oil macadam pavement has been constructed on the Tunnel Road, and on the westerly approach road from its intersection with Broadway northeasterly a distance of approximately eight hundred (800) lineal feet. Penetration oil macadam pavement which requires repairs is located in the vicinity of the Pedestrian Underpass on the westerly approach road, and on the Tunnel Road.

It is estimated that there are approximately six hundred sixty-five thousand (665,000) square feet of penetration oil macadam pavement remaining to be constructed as required by the Plans and Specifications.

It is estimated that there are approximately eight thousand eight hundred (8,800) square feet of penetration oil macadam pavement which must be repaired to complete the same as required by the Plans and Specifications.

Section 10. Concrete Curb and Gutter

The work remaining to be done under "Concrete Curb and Gutter" consists of the construction of the following:

Six inch (6″) curb in the vicinity of Margarido Drive, Buena Vista Place, Golden Gate Avenue, and Pacific Gas and Electric Substation.

Twelve inch (12″) curb in the vicinity of Sacramento Northern Railway retaining wall and in the vicinity of the East and West Tunnel portals.

Gutter in the vicinity of Margarido Drive, Buena Vista Place, Golden Gate Avenue, Sacramento Northern Railway retaining wall, and Pacific Gas and Electric Substation.

All of said curb and gutter shall be constructed as required by the Plans and Specifications.

It is estimated that there are approximately one thousand two hundred (1,200) lineal feet of six inch (6″) curb, approximately nine hundred forty-five (945) lineal feet of twelve inch (12″) curb, and approximately two thousand five hundred (2,500) square feet of gutter, remaining to be constructed.

Section 11. Cement Sidewalks

The work remaining to be done under "Cement Sidewalks" consists of the construction of cement sidewalks in the vicinity of Pedestrian Underpass, Margarido Drive, Buena Vista Place, Golden Gate Avenue, Sacramento Northern Railway Retaining Walls, and the East and West Tunnel Portals as required by the Plans and Specifications.

It is estimated that there are approximately nine thousand (9,000) square feet of cement sidewalks remaining to be constructed.

Section 12. Corrugated Metal Pipe Culverts

The work remaining to be done under "Corrugated Metal Pipe Culverts" consists of the furnishing and installing of eight inch (8") diameter corrugated metal pipe culverts for drainage purposes along the roadway approaches; twelve inch (12") diameter corrugated metal pipe culverts for drainage purposes in the vicinity of the East Portal of the Tunnel; and eighteen inch (18") diameter corrugated metal pipe culverts for drainage purposes on the West Approach roads, all as required by the Plans and Specifications.

Fill protectors remain to be constructed for drainage purposes on the West approach roads, as required by the Plans and Specifications.

It is estimated that there are approximately one thousand (1,000) lineal feet of eight-inch (8") diameter corrugated metal pipe culvert remaining to be furnished and installed, approximately one hundred fifty (150) lineal feet of twelve inch (12") diameter corrugated metal pipe culvert remaining to be furnished and installed, and approximately five hundred (500) lineal feet of eighteen inch (18") diameter corrugated metal pipe culvert remaining to be furnished and installed.

It is estimated that there are nine (9) fill protectors remaining to be furnished and installed.

Section 13. Reinforced Concrete Pipe Culvert

The work remaining to be done under "Reinforced Concrete Pipe Culvert" consists of the furnishing and installing of approximately one hundred ninety (190) lineal feet of twenty-four inch

(24") diameter reinforced concrete pipe culvert, extra strength (X type), as provided in the Plans and Specifications, for drainage purposes in the vicinity of the West Portal.

Section 14. Vitrified Pipe Sewers

The work remaining to be done under "Vitrified Pipe Sewers" consists of the construction, completion and repair of manholes with standard tops, manholes with inlet tops, manholes with grating tops, storm water inlets and lamp holes.

It is estimated that the following manholes are to be furnished and installed; one (1) manhole with standard top, one (1) manhole with inlet top, three (3) manholes with grating tops, two (2) storm water inlets, Type "B," three (3) storm water inlets, Type "C"; one (1) lamphole is to be repaired.

These items are to be installed in the vicinity of the East and West Tunnel portals and on the approach roadways, all as required by the Plans and Specifications.

All vitrified pipe required to be furnished and installed has been furnished and installed except that required in the Tunnel, and Ventilation Buildings.

Section 15. Underdrains

The work remaining to be done under "Underdrains" consists of furnishing and installing eight inch (8") perforated corrugated metal pipe underdrains in the vicinity of the East and West Tunnel portals and along the West Approach roadways for drainage purposes, as required by the Plans and Specifications.

It is estimated that there are approximately two thousand one hundred (2,100) lineal feet of underdrains remaining to be furnished and installed.

Section 16. Piping

The work remaining to be done under "Piping" consists of the furnishing and installing of all of the six inch (6") diameter cast iron pipe together with all fittings and accessories, as required by the Plans and Specifications, outside the Tunnels and Ventilation Buildings. Piping within the Tunnels and Ventilation Buildings is provided for in Sections twenty-one (21) and twenty-two (22) of this Supplement.

It is estimated that there are approximately two thousand twenty (2,020) lineal feet of piping, cast iron, six inch (6") diameter, remaining to be furnished and installed, outside the Tunnels and Ventilation Buildings.

Section 17. Guard Rails and Pipe Hand Rails

The work remaining to be done under "Guard Rails and Pipe Hand Rails" consists of the construction of all guard rails required by the Plans and Specifications but not yet constructed. Seven hundred (700) lineal feet of guard rails have been constructed along the Tunnel Road.

It is estimated that approximately twelve thousand (12,000) lineal feet of guard rails required by the Plans and Specifications remain to be constructed.

Pipe hand rails remain to be constructed, as required by the Plans and Specifications, on walls, in the vicinity of Golden Gate Avenue, Temescal Culvert, Pacific Gas and Electric Substation, and underpasses.

It is estimated that approximately six hundred twenty (620) lineal feet of pipe hand rail remain to be constructed.

Pipe hand rails partially completed shall be finished and completed as required by the Plans and Specifications. All pipe hand rails already in place which have been damaged shall be repaired, or new material supplied to complete the same, all as required by the Plans and Specifications.

Section 18. Rip Rap

The work remaining to be done under "Rip Rap" consists of the construction of rip rap structures in the vicinity of the Landvale Overhead structure as required by the Plans and Specifications.

It is estimated that there are approximately ninety (90) cubic yards of rip rap remaining to be constructed.

Section 19. Paint and Painting

The work remaining to be done under "Paint and Painting" consists of:

(a) The painting, as required by the Plans and Specifications, of all structural steel not yet installed;

(b) The completion of the painting, as required by the Plans and Specifications, of all struc-

tural steel which has not yet received the requisite number of coats;

(c) The repainting, to the standard required by the Plans and Specifications, of all surfaces heretofore painted which have been damaged;

(d) The painting, as required by the Plans and Specifications, of all timber guard rail which has not yet been constructed; and completion of the painting of constructed timber guard rail which has not yet received the requisite number of coats, or on which paint coats have become damaged.

The Contractor shall examine carefully and thoroughly all painted or partially painted structures, and shall satisfy himself as to conditions there existing and the amount of work remaining to be done in connection with additional coats of paint and the repainting of damaged surfaces so that same shall conform to the requirements of the Plans and Specifications.

The decision of the Engineer as to the locations and surfaces which may require additional coats of paint or repainting of damaged surfaces at any time during the progress of the work, shall be final and no extra payment will be allowed in the event the Contractor shall claim that the amount of repainting, or completion of partially painted surfaces required by the District Engineer does not correspond with that estimated by the Contractor.

Section 20. Metal Cribbing

The work remaining to be done under "Metal Cribbing" consists of furnishing and placing of the metal cribbing in the vicinity of the Landvale Viaduct as required by the Plans and Specifications.

No metal cribbing has been furnished or installed. It is estimated that there are approximately forty-six thousand (46,000) pounds of metal cribbing to be furnished and installed.

Section 21. Tunnel Construction

"Tunnel Construction" covers the construction of tunnels complete, as required by the Plans and Specifications. Some work has been performed on every portion of the tunnels, but no portion is complete. A general description of the approximate amount of the work which remains to be done to complete the "Tunnel Construction" is as follows: (for convenience, in addition to the description of the approximate lineal feet of items of work remaining to be done, the description by Engineer's Stations of approximate location of items is also given.)

1. Upgrade or South Tunnel:

(a) Excavation: Four hundred forty-six (446) lineal feet, (Stations 135+79 to 140+25), of excavation remains to be performed. Two (2) drifts have been excavated through this length. The necessary maintenance and support of these drifts to pre-

vent cave-in shall be performed by the Contractor during the progress of the excavation of this Tunnel.

(b) Concrete Arch Ring: Five hundred eighty-two (582) lineal feet of concrete arch ring remains to be constructed, (Stations 134+28 to 140+10). Footings for concrete arch ring have been constructed ahead of the full ring a distance of one hundred twenty-eight (128) lineal feet, (Stations 134+28 to 135+56).

(c) Grouting: Grouting has been completed a distance of one thousand forty-seven (1,047) lineal feet, (Stations 111+53 to 122+00), from the West end of the concrete arch ring. There remains one thousand three hundred sixteen (1,316) lineal feet, (Stations 122+00 to 134+28 and 140+10 to 140+98), of the concrete arch ring now installed around which groutings is to be placed, as required by the Plans and Specifications. Grouting, as required by the Plans and Specifications, shall be placed around all portions of the concrete arch ring hereafter constructed.

(d) Ceilings and Partitions: The ceiling or partition between the fresh air duct and the exhaust air duct has been partially constructed a distance of eight hundred eighty-one (881) lineal feet from the West end of the concrete arch ring, (Stations 111+53 to 120+34). The ceiling or partition between the roadway portion of the Tunnel and the exhaust air duct has been partially constructed a distance of eight hundred eighty-four (884) lineal

feet, (Stations 111+53 to 120+37), from the West end of the concrete arch ring.

Patching, finishing and painting of the surfaces of the concrete on the partially constructed portions of the ceilings and partitions remain to be done.

Gunite partitions and other partition details, and air duct bulkheads, remain to be constructed in connection with these partially constructed ceilings and partitions. Exhaust port openings have been left in partially constructed ceilings. Slides, deflectors and other details required by the Plans and Specifications remain to be installed.

Completion of these partially constructed portions and the construction of ceilings and partitions in all of the remainder of the Tunnel, with all accessories, remain to be done as required by the Plans and Specifications.

(e) Side Walls and Fresh Air Flues: Side walls and fresh air flues have been partially constructed and installed a distance of eight hundred eighty-four (884) lineal feet, (Stations 111+53 to 120+37), from the Westerly end of the concrete arch ring; these walls require surface finishing, patching and painting, and flues require cleaning out, and setting and adjustment of nozzle openings, as required by the Plans and Specifications.

Finishing of partially completed walls and installation of flues and construction of flues and side walls in all remaining portions of the tunnels, as required by the Plans and Specifications, remain to be done.

(f) Curbs and Sidewalks: No part of the curbs and sidewalks required for the completion of this Tunnel has been constructed, and all remains to be done, as required by the Plans and Specifications.

(g) Roadway Pavement: No portion of the subgrade or roadway pavement required by the Plans and Specifications has been constructed, and all remains to be done.

(h) Drainage Structures and Conduits: No portions of the drainage structures and conduits required by the Plans and Specifications have been constructed, except drains installed back of and through the arch ring in the portion of the Tunnel in which the concrete arch ring and footings have been constructed; the Contractor will be required to furnish and construct all remaining portions of drainage structures and conduits, as required by the Plans and Specifications, in the portions of this Tunnel in which the concrete arch ring and footings have been constructed. In all portions of this Tunnel in which the concrete arch ring and footings have not been placed, the complete drainage structures and conduits, as required by the Plans and Specifications, shall be furnished, constructed and installed by the Contractor.

(i) Water Pipes: No part of the water pipes required to be constructed in this Tunnel has been constructed. The Contractor will be required to furnish and install all water pipes, cocks, plugs, adaptors and other necessary accessories, as re-

quired by the Plans and Specifications, in the entire length of this Tunnel.

2. Downgrade or North Tunnel:

(a) Excavation: Nine hundred sixty-two (962) lineal feet, (Stations 129+86 to 139+48), of excavation remains to be performed. One (1) drift has been excavated through on the South side; on the North side of this Tunnel a drift has been excavated a distance of approximately seven hundred eighty-two (782) lineal feet westerly from the East Portal, and a distance of approximately one hundred fifty-nine (159) lineal feet easterly from the face of the main excavation; the distance remaining unexcavated between the ends of this drift is approximately ninety-nine (99) lineal feet; the necessary maintenance and support of these drifts to prevent cave-in shall be performed by the Contractor during the progress of the excavation of this Tunnel.

(b) Concrete Arch Ring: One thousand eighty-nine (1,089) lineal feet of concrete arch ring remains to be constructed (Stations 128+50 to 139+39). Footings for concrete arch ring have been constructed ahead of the full ring a distance of one hundred and twenty-one (121) lineal feet, (Stations 128+50 to 129+71).

(c) Grouting: Grouting has been completed a distance of one thousand one hundred and seven (1,107) lineal feet, (Stations 111+43 to 122+50), from the West end of the concrete arch ring. There

remains six hundred seventy-nine (679) lineal feet, (Stations 122+50 to 128+50 and 139+39 to 140+18), of the concrete arch ring now installed around which grouting is to be placed, as required by the Plans and Specifications. Grouting, as required by the Plans and Specifications, shall be placed around all portions of the concrete arch ring hereafter constructed.

(d) Ceilings and Partitions: The ceiling or partition between the fresh air duct and the exhaust air duct has been partially constructed a distance of eight hundred seventy-three (873) lineal feet from the West end of the concrete arch ring, (Stations 111+43 to 120+16). The ceiling or partition between the roadway portion of the Tunnel and the exhaust air duct has been partially constructed a distance of eight hundred eighty-four (884) lineal feet, (Stations 111+43 to 120+27), from the West end of the concrete arch ring.

Patching, finishing and painting of the surfaces of the concrete on the partially constructed portions of ceilings and partitions remain to be done.

Gunite partitions and other partition details, and air duct bulkheads, remain to be constructed in connection with these partially constructed ceilings and partitions. Exhaust port openings have been left in partially constructed ceilings. Slides, deflectors and other details required by the Plans and Specifications remain to be installed.

Completion of these partially constructed portions and the construction of ceilings and parti-

tions in all of the remainder of the Tunnel, with all accessories, remains to be done, as required by the Plans and Specifications.

(e) Side Walls and Fresh Air Flues: Side walls and fresh air flues have been partially constructed and installed a distance of eight hundred eighty-four (884) lineal feet, (Stations 111+43 to 120+27), from the Westerly end of the concrete arch ring; these walls require surface finishing, patching and painting; and flues require cleaning out, and setting and adjustment of nozzle openings, as required by the Plans and Specifications.

Finishing of partially completed walls and installation of flues and construction of flues and side walls in all remaining portions of the Tunnels, as required by the Plans and Specifications, remain to be done.

(f) Curbs and Sidewalks: No part of the curbs and sidewalks required for the completion of this Tunnel has been constructed, and all remains to be done, as required by the Plans and Specifications.

(g) Roadway Pavement: No portion of the subgrade or roadway pavement required by the Plans and Specifications has been constructed, and all remains to be done.

(h) Drainage Structures and Conduits: No portions of the drainage structures and conduits required by the Plans and Specifications have been constructed, except drains installed back of and through the arch ring in the portion of the Tunnel

in which the concrete arch ring and footings have been constructed; the Contractor will be required to furnish and construct all remaining portions of drainage structures and conduits, as required by the Plans and Specifications, in the portions of this Tunnel in which the concrete arch ring and footings have been constructed. In all portions of this Tunnel in which the concrete arch ring and footings have not been placed, the complete drainage structures and conduits, as required by the Plans and Specifications, shall be furnished, constructed and installed by the Contractor.

(i) Water Pipes: No part of the water pipes required to be constructed in this Tunnel have been constructed. The Contractor will be required to furnish and install all water pipes, cocks, plugs, adaptors and other necessary accessories, as required by the Plans and Specifications, in the entire length of this Tunnel.

3. Cross Adits:

The two (2) most Westerly "Cross Adits" of the three (3) required by the Plans and Specifications have been completed. Excavation for the third cross adit has been started from the South or Upgrade Tunnel and the excavation has proceeded approximately fifteen (15) lineal feet toward the North or Downgrade Tunnel. The Contractor is required to complete this adit as required by the Plans and Specifications.

4. Completion of Tunnels:

The Contractor shall complete the Tunnels in every detail, as required by the Plans and Specifications. The general description of work remaining to be constructed and completed, as hereinabove set forth, is approximately only and, in particular, does not include a complete statement of the repairs and re-finishing that will be required to finish the work as left in place by the Contractor who abandoned the work on this project. The Contractor shall perform all work, furnish all labor, materials, tools and equipment necessary and incidental to the repair and re-finishing of work now in place, and the execution of all additional work required for the completion of the "Tunnel Construction" as specified. The omission herein of specific mention of any detail, item, or quantity shall not relieve the Contractor of his responsibility and obligation to perform all labor and furnish all materials of each and every kind necessary and to construct, complete, and finish these Tunnels in every detail as required by the Plans and Specifications; all of this is to be done without other payment therefor than the price bid for "Tunnel Construction."

5. Payment:

The price bid and the price to be paid by the District, to complete "Tunnel Construction" shall constitute full compensation to the Contractor for the completion of "Tunnel Construction" including cross adits, as required by the Plans and Specifica-

tions, except that "Reinforcing Steel" shall be paid for per pound in place, as provided in the Specifications.

Section 22. Ventilation Buildings

The "Ventilation Buildings" required by the Plans and Specifications to be constructed at the Easterly and Westerly ends of the Tunnel are partially constructed.

The Contractor shall complete the Ventilation Buildings in every detail as required by the Plans and Specifications. The Contractor shall perform all work, furnish all labor, materials, tools and equipment necessary and incidental to the repair and refinishing of work now in place, and required for the completion of the construction of these buildings in accordance with the Plans and Specifications.

The roofing over the fan room of the West ventilation building has been damaged and was rejected by the District prior to the abandonment of the work by the former Contractor. The Contractor who completes the work shall completely reconstruct this roofing, damaged roofing to be removed and new roofing to be furnished and constructed in accordance with the Plans and Specifications. The Contractor shall patch and repair defective or damaged wall surfaces and all other portions of said structures.

The foregoing general description of the work remaining to be done, constructed and completed,

as herinabove set forth, is approximate only and, in particular, does not include a complete statement of the repairs and refinishing that will be required to complete the structures as left in place by the Contractor who abandoned the work on this project. The omission herein of specific mention of any detail, item or quantity shall not relieve the Contractor of his responsibility and obligation to provide all labor, tools, equipment, and materials of each and every kind necessary to construct, complete and finish the Ventilation Buildings in every detail as required by the Plans and Specifications. All of this is to be done without other payment therefor than the price bid for the completion of the Ventilation Buildings.

Section 23. Ventilation Equipment

The "Ventilation Equipment" required by the Plans and Specifications to be furnished and installed in the Ventilation Buildings at the Easterly and Westerly ends of the Tunnel has been partly furnished and installed.

The Contractor is required to furnish and install all of the remainder of the ventilation equipment in both of the said buildings in every detail, as required by the Plans and Specifications, and the Contractor shall perform all work and furnish all labor, tools, material, equipment and accessories necessary to complete the installation of the ventilation equipment strictly in accordance with the requirements of the Plans and Specifications.

The Contractor shall make a detailed examination

of the ventilation equipment now on the project and shall satisfy himself as to the amount and existing conditions thereof, and as to the amount of material, equipment and accessories remaining to be furnished, and work remaining to be done; and, in addition to furnishing all labor, tools, materials, equipment and accessories necessary to complete the same, the Contractor shall make all necessary repairs and adjustments to the portions of the ventilation equipment now in place, and do all things necessary in order that, at the completion of the Contract, the ventilation equipment shall be complete in every respect, and shall meet all of the requirements and tests set forth in the Plans and Specifications.

Section 24. Mechanical Equipment

The "Mechanical Equipment" required by the Plans and Specifications to be furnished and installed on the project of the District has been partly furnished and installed.

The Contractor is required to furnish and install all of the remainder of the mechanical equipment on the project in every detail, as required by the Plans and Specifications, and the Contractor shall perform all work and furnish all labor, tools, material, equipment and accessories necessary to complete the installation of the mechanical equipment strictly in accordance with the requirements of the Plans and Specifications.

The Contractor shall make a detailed examination of the mechanical equipment now on the project,

and shall satisfy himself as to the amount and existing conditions thereof, and as to the amount of material, equipment and accessories required to be furnished, and work remaining to be done; and, in addition to furnishing all labor, tools, materials, equipment and accessories necessary to complete the same, the Contractor shall make all necessary repairs and adjustments to the portions of the mechanical equipment now in place, and do all things necessary in order that, at the completion of the Contract, the mechanical equipment shall be complete in every respect, and shall meet all of the requirements and tests set forth in the Plans and Specifications.

Section 25. Electrical Equipment

The "Electrical Equipment" required by the Plans and Specifications to be furnished and installed on the project of the District has been partly furnished and installed.

The Contractor is required to furnish and install all of the remainder of the electrical equipment on the project in every detail, as required by the Plans and Specifications, and the Contractor shall perform all work and furnish all labor, tools, material, equipment and accessories necessary to complete the installation of the electrical equipment strictly in accordance with the requirements of the Plans and Specifications.

The Contractor shall make a detailed examination of the electrical equipment now on the project,

and shall satisfy himself as to the amount and existing conditions thereof, and as to the amount of material, equipment and accessories required to be furnished, and work remaining to be done; and, in addition to furnishing all labor, tools, materials, equipment and accessories necessary to complete the same, the Contractor shall make all necessary repairs and adjustments to the portions of the electrical equipment now in place, and do all things necessary in order that, at the completion of the Contract, the electrical equipment shall be complete in every respect, and shall meet all of the requirements and tests set forth in the Plans and Specifications.

Section 26. Carbon Monoxide Detectors and Recorders

The "Carbon Monoxide Detectors and Recorders" shall be furnished and installed, as required by the Plans and Specifications.

No part of this equipment has been furnished or installed.

Section 27. Completion Painting, Repairing Damage, Repairing Imperfect Work and Cleaning Up

The Contractor shall perform all work, furnish all labor, tools, material and equipment necessary for finishing and completing all parts of the work in every detail, as required by the Plans and Specifications, in a workmanlike manner.

Without limiting the generality of the foregoing, and as a general description of the work required

to be done in repairing damaged and imperfect work, the Contractor shall perform all work and furnish all labor, tools, material and equipment necessary to repair and complete the partially constructed shoulders hereinbefore mentioned; to brush, clean, straighten and otherwise adjust exposed reinforcing steel as hereinbefore mentioned; to repair the lamphole hereinbefore mentioned; to complete partially completed pipe hand rails and repair damaged pipe hand rails hereinbefore mentioned; to complete the paint and painting hereinbefore mentioned; and to repair and complete any other work which is imperfect or has been damaged in any manner whatsoever; all to be performed in a manner and with the purpose that all parts of the work shall be completed in accordance with the requirements of the Plans and Specifications.

The Contractor shall also clean out all culverts and drainage channels which have become blocked or otherwise obstructed in any manner during previous construction operations or during Contractor's operations, and shall maintain and keep the same clear at all times during construction as a part of the work to be performed under the Contract; the Contractor shall also, as a part of the work to be performed under the Contract remove all debris, construction material, construction buildings and construction equipment, whether placed there by the Contractor, or by the contractor who heretofore abandoned work on the project, from the project at the close of construction in order that the project shall be left in a clean, sightly and finished

condition throughout the entire area thereof. The Contractor shall also remove all of the debris, construction material, construction buildings and construction equipment from all areas adjacent to the project which have been occupied or used by the Contractor, or by the contractor who heretofore abandoned work on the project, during construction and leave said areas in a clean, sightly condition.

The price bid for "Completing Painting, Repairing Damage, Repairing Imperfect Work and Cleaning Up" shall constitute full compensation to the Contractor for the furnishing of all labor, tools, material and equipment and the performance of all work necessary or incidental to the completion of the above described work.

Section 28. Conditions Respecting Removal of Construction Equipment, Construction Plant, and Personal Property Now Located on the Right of Way of the District

Certain construction equipment, construction plant, and other personal property owned by or in the possession of Six Companies of California, a corporation, is now located on the right of way of the District, or adjacent thereto.

Prospective bidders are hereby notified that under a guaranteed written agreement with the District, Six Companies of California will remove all said construction equipment, construction plant, and personal property from the right of way of the District, at its own cost and expense within twenty-

one (21) calendar days from and after the date fixed by the District as the day upon which bids will be received for the completion of the project, or within ten (10) calendar days from and after the date of execution of a Contract for completion of the project of the District, depending on which time gives Six Companies of California the greatest length of time to remove the same, if the Contractor to whom a contract is awarded by the District does not effect arrangements satisfactory to himself and said Six Companies of California, with said Company, for the use of said construction equipment, construction plant and other personal property, in the performance of the work.

The foregoing notification is not intended as, nor shall it be construed as a provision of this Supplement requiring or recommending that Prospective bidders effect an arrangement with said Six Companies of California for the use of said construction equipment, construction plant, and other personal property, and the same is incorporated herein for the sole purpose of advising all prospective bidders of the fact that said construction equipment, construction plant, and other personal property, will be removed from the right of way of the District, without cost to the Contractor hereunder, if, for any reason, such Contractor does not desire to use the same.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. X-3. Filed June 1, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT X-11.

Joint Highway District No. 13 of the State of California.

SUPPLEMENT TO SPECIFICATIONS.

For Construction of Project of the District, Including Highway, Highway Tunnel and Approaches with Appurtenant Structures, Adopted March 30, 1933, as Amended and Supplemented by Amendments and Supplements to Said Specifications Adopted January 9, 1934 and April 3, 1934, Respectively.

WALLACE B. BOGGS,
District Engineer

DIRECTORS

Thomas E. Caldecott.....President
Harry M. Stow.....Secretary
Henry L. Hinman.....Treasurer

LEGAL

Archibald B. Tinning.....Attorney

Adopted September 23, 1936.

Specification No.....
Set No.....

JOINT HIGHWAY DISTRICT No. 13 OF THE STATE OF CALIFORNIA

Office of
WALLACE B. BOGGS
District Engineer
1448 Webster Street,
Oakland, California

Adopted September 23rd, 1936.

Supplement to Specifications for Construction of Project of the District, Including Highway, Highway Tunnel and Approaches with Appurtenant Structures, Adopted March 30, 1933, as Amended and Supplemented by Amendments and Supplements to Said Specifications Adopted January 9, 1934 and April 3, 1934, Respectively.

PART I—STATEMENT OF CONDITIONS.

Section 1—General Conditions.

A contractor under contract with Joint Highway District No. 13 of the State of California abandoned work on the project of this District described in said Specifications on or about the 13th day of June, 1936, after performing part of the work described in the Plans and Specifications for said project, and left uncompleted the remainder of such work substantially as hereinafter described.

This Supplement to said Specifications describes the work remaining to be performed on the project of the District. All of the said work remaining to

be done is to be performed in accordance with the Plans and Specifications adopted by the Board of Directors of Joint Highway District No. 13 of the State of California on the 30th day of March, 1933, as amended and supplemented by amendments and supplements thereto adopted on January 9, 1934 and April 3, 1934, respectively, and with this Supplement thereto, and in strict compliance with all of the terms thereof; with the intent and purpose that the work shall be completed in every part, in every respect as required by the said Plans and Specifications.

In order to provide a method of procedure for completing the project of the District, which has been partially constructed as hereinbefore mentioned, the work remaining to be performed to complete the project has been subdivided, and the District will advertise for the tender of proposals from contractors to enter into contracts wherein the Contractor will contract with the District to perform all work, furnish all labor, materials, tools, and equipment necessary and incidental for finishing and completing the portions of the project included within each such subdivision, at such time or times as are hereafter determined upon by the District, under schedules hereinafter set forth.

The Contractor who undertakes the completion of any portion of the project included in any schedule for said portion of the project as hereinafter set forth, shall do and perform and complete every portion of the work set forth in said schedule now re-

maining unperformed or partly completed, in every respect in accordance with the Plans and Specifications.

Prospective bidders, under any schedule for any portion of the project, shall examine the site of the work and all structures and parts of structures to which said schedule pertains, and are required to satisfy themselves as to the conditions there existing and the amount of work remaining to be done to complete the portion of said project included within said schedule.

The description of the work hereinafter set forth is an approximation or estimate of the work remaining to be done. It is hereby declared and shall be understood by all prospective bidders that the quantities set forth herein or on any Proposal Sheet, or Notice to Contractors, or in any Contract executed hereunder for any schedule, are approximate only, and are given as a basis for comparison of bids. Any Contractor whose proposal on any schedule is accepted shall, by the terms of his Contract with the District, guarantee to furnish all labor, materials, tools and equipment and to perform all work necessary or incidental to the construction and completion of the portions of the project remaining to be completed to which said schedule applies, as detailed, specified and intended, so as to furnish upon completion of said contract the completed portion of the project included in said schedule as required by the Plans and Specifications.

Joint Highway District No. 13 of the State of California reserves the right to increase or decrease the amount of any part or portion of the work, or to omit such portions of the work as the District Engineer may deem it necessary or expedient to omit.

Wherever in this Supplement a basis for payment for any part of the work is provided which differs, conflicts or is at variance with the basis of payment provided for in other parts of the Specifications, the basis for payment set forth in this Supplement shall govern.

Wherever the words "Plans", "Specifications", "Plans and Specifications" are herein used, the same shall be construed as meaning the Plans and Specifications for the project of the District adopted by the Board of Directors of Joint Highway District No. 13 of the State of California on the 30th day of March, 1933, as amended and supplemented by the amendments and supplements thereto adopted January 9, 1934, and April 3, 1934, respectively, and by this Supplement thereto.

Part II—Description of Subdivisions of Project—Schedules for Construction.

The following is a description of the schedules into which the work remaining to be performed, and the material and equipment remaining to be furnished and supplied, to complete the project of the District, which has been partially constructed as hereinbefore mentioned, has been subdivided; the

District will advertise for separate proposals from contractors to perform all work, furnish all labor, tools, material and equipment necessary for, and incidental to, completing all parts of the work, included in each separate schedule as follows:

Schedule A—Completion of Excavation of Tunnels and Cross Adit and Completion of Construction of Concrete Arch Ring Lining of Tunnels and Cross Adit.

Under this schedule the Contractor shall complete the excavation of the tunnels and cross adit, and the construction of the concrete arch ring tunnel linings, and cross adit lining, together with the grouting around the portions of the arch ring tunnel linings which are to be constructed under this schedule, and shall furnish and install dowels and hanger connections, drainage structures and conduits required to be embedded in the concrete arch ring tunnel linings.

"Reinforcing Steel" required in the construction of the concrete arch ring tunnel linings and cross adit lining shall be furnished and installed by the Contractor under this schedule.

Schedule B—Completion of Grouting in Tunnels Around Concrete Lining Now Installed.

Under this schedule the Contractor shall complete the grouting, as required by the Plans and Specifications, around the concrete arch ring tunnel linings now installed in each tunnel, where grouting has not been completed. The portions of the concrete arch

ring tunnel linings around which the Contractor under this schedule will be required to place grouting are set forth in Section 21 of Part IV hereof.

Grouting will be measured and paid for under this schedule by the barrel of cement used in such grouting, and the price to be paid for grouting under this schedule shall constitute full compensation to the Contractor to whom a contract is awarded under this schedule, for furnishing of all labor and material, tools and equipment necessary and incidental to the performance of the work included within this schedule.

Schedule C—Completion of Tunnel Construction Remaining to Be Completed After Concrete Arch Ring Tunnel Lining Is Constructed and Grouting Is Completed.

Under this schedule the Contractor shall complete the construction of ceilings and partitions, including furnishing and installing of structural steel, sidewalls and fresh air flues, curbs and sidewalks, roadway pavement, drainage structures and conduits, water pipes and all other portions of the work necessary for the completion of the partially completed tunnels throughout their entire length as required by the Plans and Specifications under "Tunnel Construction", excepting the portions thereof described in Schedule A and Schedule B hereof.

"Reinforcing Steel" required in the construction of the portions of the tunnels described in this schedule shall be furnished and installed by the Contractor under this schedule.

Portions of "Electrical Equipment" within the limits of the tunnel structures which are required to be embedded in the concrete or are required to be furnished and installed either prior to or concurrently with the placing of concrete, shall be furnished and installed by the Contractor under this schedule. Said portions of "Electrical Equipment" consist of conduits, outlet boxes, luminaire bodies, transformer cabinets and pull boxes, fire alarm and police telephone boxes, and accessories thereto, conduit crossovers, including drilling therefor, all as required by the Plans and Specifications.

Schedule D—Completion of Ventilation Buildings.

Under this schedule the Contractor shall complete the Ventilation Buildings as required by the Plans and Specifications.

Portions of "Electrical Equipment" within the limits of the ventilation building structures, which are required to be embedded in the concrete or are required to be furnished and installed either prior to or concurrently with the placing of concrete shall be furnished and installed by the Contractor under this schedule. Said portions of "Electrical Equipment" consist of conduits, outlet boxes, pull boxes, luminaire bodies, fire alarm and police telephone boxes, and accessories thereto, all as required by the Plans and Specifications.

Schedule E—Completion of Ventilation Equipment, Mechanical Equipment, and Electrical Equipment.

Under this schedule the Contractor shall complete the furnishing and installing of Ventilation Equipment, Mechanical Equipment, and Electrical Equipment, as required by the Plans and Specifications, excepting such portions of Electrical Equipment as are required to be furnished and installed under Schedule C and Schedule D hereof.

The work included in this Schedule E has been further subdivided for the purpose of obtaining alternate proposals for furnishing and installing the equipment included in each such subdivision thereof. The said subdivision of Schedule E is as follows:

Subdivision 1—Schedule E—Completion of Ventilation Equipment.

Under this subdivision of this schedule, the Contractor shall complete the furnishing and installing of the Ventilation Equipment as required by the Plans and Specifications.

Subdivision 2—Schedule E—Completion of Mechanical Equipment.

Under this subdivision of this schedule, the Contractor shall complete the furnishing and installing of the Mechanical Equipment as required by the Plans and Specifications.

Subdivision 3—Schedule E—Completion of Electrical equipment.

Under this subdivision of this schedule, the Contractor shall complete the furnishing and installing of the Electrical Equipment as required by the Plans and Specifications, excepting such portions of Electrical Equipment as are required to be installed under Schedule C and Schedule D hereof.

Prospective bidders under Schedule E will be required to bid upon Schedule E as a whole under an alternate proposal No. 1, and upon each and all of the hereinbefore set forth subdivisions of Schedule E as an alternate proposal No. 2.

The District reserves the right to accept or reject any or all proposals submitted under this Schedule E; to accept one or more subdivisions of alternate proposal No. 2, and to reject other subdivisions of alternate proposal No. 2, as the interest of the District may require.

Schedule F—Carbon Monoxide Detectors and Recorders.

Under this schedule the Contractor shall furnish and install Carbon Monoxide Detectors and Recorders complete as required by the Plans and Specifications.

Schedule G—Highway Construction and Appurtenant Structures.

Under this schedule the Contractor shall complete the highway approach roads and the structures thereon, outside the limits of the tunnels and ven-

tilation buildings, including all Grading, Overhaul, Excavation for Structures, Subgrade, Shoulders, Reinforcing Steel, Concrete Structures, Portland Cement Concrete Pavement, Penetration Oil Macadam Pavement, Concrete Curb and Gutter, Cement Sidewalks, Corrugated Metal Pipe Culverts, Fill Protectors, Reinforced Concrete Pipe Culvert, Vitrified Pipe Sewers, Underdrains, Piping, Guard Rails and Pipe Hand Rails, Rip Rap, Paint and Painting, Metal Cribbing, Completing Painting, Repairing Damage and Imperfect Work and Drainage, all in accordance with the Plans and Specifications.

Schedule H—Steel Structures.

Under this schedule the Contractor shall furnish and place the structural steel trusses, purlins, and connections which support the louver frames between the approach walls at the portals at each end of the tunnels, all as required by the Plans and Specifications.

Other Contracts—Cooperation Between Contractors.

The District will award contracts for the various divisions of the work described in the schedules hereinbefore set forth, and each Contractor to whom a contract is awarded by the District for the performance of the work to be performed, under any and all of said schedules, shall fully cooperate with all other Contractors on the project, and carefully fit his own work to that provided for under other contracts. No contractor shall commit, nor permit, any act which will interfere with the performance of the work of any other Contractor.

Cleanup.

Each Contractor performing work on the project of the District under any schedule or schedules hereof, shall before acceptance of the work by the District, remove from the site of the work and any and all areas adjacent thereto, occupied or used by him, all debris, excess construction material, falsework, temporary structures created, placed, used or constructed by him, in connection with the performance of his contract, so as to leave the project in a clean, orderly and sightly condition.

Part III—Time of Completion, Extensions of Time, Damages for Delay.

(a) Time of Completion.

The entire work described in each of the various schedules hereinbefore mentioned shall be completed within periods as follows:

Schedule A—One hundred eighty (180) calendar days from the date of execution of the contract therefor.

Schedule B—Sixty (60) calendar days from the date of execution of the contract therefor.

Schedule C—Two hundred (200) calendar days from the date of execution of the contract therefor.

Schedule D—One hundred fifty (150) calendar days from the date of execution of the contract therefor.

Schedule E—One hundred fifty (150) calendar days from the date of execution of the contract therefor.

Subdivision 1—Schedule E—One hundred fifty (150) calendar days from the date of execution of the contract therefor.

Subdivision 2—Schedule E—One hundred fifty (150) calendar days from the date of execution of the contract therefor.

Subdivision 3—Schedule E—One hundred fifty (150) calendar days from the date of execution of the contract therefor.

Schedule F—One hundred fifty (150) calendar days from the date of execution of the contract therefor.

Schedule G—Two hundred (200) calendar days from the date of execution of the contract therefor.

Schedule H—One hundred (100) calendar days from the date of execution of the contract therefor.

(b) Extensions of Time.

The following supplementary provisions to the Specifications relative to extension of time are inserted herein to provide a means for extending the time of completion under contracts awarded for work to be performed under the various schedules into which the work of completing the project has been subdivided, and the same do not modify, rescind, vacate or repeal any other provision of the Specifications, relating to extensions of time.

The time during which any Contractor under any contract awarded under any schedule of these Specifications, is delayed by reason of the failure of any other Contractor to complete work under another

contract, which work must be completed to enable the first mentioned Contractor to proceed with the work required to be performed under his contract shall be added to the period fixed in his contract as the period within which the work thereunder shall be completed, provided that the Board of Directors approve the written application of such first mentioned Contractor for such extension, which application must be made to the Board of Directors by such first mentioned Contractor at the time such delay first occurs, and before the expiration of the time of completion fixed in his contract, and thereafter the time for completion under such contract shall be extended for the period fixed in the resolution of the Board of Directors granting the application for such extension; provided that no Contractor shall be entitled to an extension of time for completing the work required to be performed under his contract, if at the time such delay first occurs by reason of the failure of any other Contractor to complete work, there remain portions of the work to be performed by the first mentioned Contractor upon which, in the judgment of the District Engineer, the first mentioned Contractor may proceed, without undue interference by reason of delay in the performance of the work of such other Contractor or Contractors.

(c) Damages for Delay.

All parties to all contracts awarded for the work to be performed, described in said schedules, shall

and do hereby expressly stipulate and agree that time is the essence of each of said contracts. In case the work is not completed within the time specified in any contract for any schedule hereof, or within such extensions of the contract time as may be allowed under these specifications, it is distinctly understood and agreed by each such Contractor that the Contractor shall pay the District as agreed and liquidated damages, and not as a penalty, the amounts hereinafter set forth for the various schedules, for each and every working day which may elapse between the limiting date as herein provided and the date of actual completion of the work required to be performed under each such contract; each of said sums pertaining to each contract awarded under each of said schedules, being hereby specifically agreed upon by each such Contractor, as a measure of the damage to the District by reason of delay in the completion of the work under each such contract, it being expressly stipulated and agreed by each such Contractor that it would be impracticable to estimate and ascertain the actual damages sustained by the District under such circumstances, and each such Contractor hereby agrees and consents that the amount of liquidated damages so fixed, shall be deducted and retained by the District from any money then due, or thereafter to become due such Contractor.

The stipulated amounts of agreed and liquidated

damages to be inserted as a provision in each contract to be awarded for the portion of the work of the completion of the project of the District, and included in each of said schedules, are as follows:

Schedule A—Five Hundred Dollars ($500) per day.

Schedule B—Fifty Dollars ($50) per day.

Schedule C—Five Hundred Dollars ($500) per day.

Schedule D—One Hundred Dollars ($100) per day.

Schedule E—One Hundred Dollars ($100) per day.

Subdivision 1—Schedule E—One Hundred Dollars ($100) per day.

Subdivision 2—Schedule E—One Hundred Dollars ($100) per day.

Subdivision 3—Schedule E—One Hundred Dollars ($100) per day.

Schedule F—Fifty Dollars ($50) per day.

Schedule G—Two Hundred Fifty Dollars ($250) per day.

Schedule H—Fifty Dollars ($50) per day.

Part IV—Description of Work Remaining to Be Performed.

Section 1—Grading.

The work remaining to be done under "Grading" consists of the completion of the excavation and filling of the roadway prism to specified grade and

cross section, the construction of drainage ditches, the removal of slides and disposing of surplus material, and the performance of all necessary work as required by the Plans and Specifications.

It is estimated that there are approximately forty-five thousand (45,000) cubic yards of material remaining to be excavated.

Overhaul to be performed as specified is estimated to be approximately five hundred thousand (500,000) station yards.

Section 2—Excavation for Structures.

The work remaining to be done under "Excavation for Structures" consists of excavation for structures for which the excavations have not yet been made, or have not yet been completed, and the necessary backfilling thereof; also backfilling of all other structures at all points where such backfilling is not at present completed as required by the Plans and Specifications.

It is estimated that there are approximately seven hundred (700) cubic yards of excavation remaining.

Uncompleted backfilling is estimated to consist of approximately four hundred (400) cubic yards. No measurement will be made or separate payment allowed for backfilling. Full compensation for furnishing all materials, labor, tools, implements, equipment and supplies, and doing all work incidental to backfilling shall be considered as included in the price paid for "Excavation for Structures".

Section 3—Subgrade.

The work remaining to be done under "Subgrade" consists of the construction of the subgrade in all places designated as required by the Plans and Specifications where pavement has not yet been laid.

It is estimated that there are approximately seven hundred two thousand seven hundred (702,700) square feet of subgrade remaining to be constructed, outside of tunnels and ventilation buildings. (Subgrade to be constructed in tunnels and ventilation buildings is included in the work provided for in Section Twenty-one (21) and Section Twenty-two (22), of Part IV of this Supplement, respectively).

Section 4—Shoulders.

The work remaining to be done for completion of "Shoulders" consists of the construction of shoulders at locations designated in the Plans and Specifications where the same have not yet been constructed, and the completion of shoulders partly constructed, but not yet completed, as required by the Plans and Specifications.

It is estimated that there are approximately two hundred forty-five thousand (245,000) square feet of shoulders remaining to be constructed, and that there are approximately one thousand eight hundred (1,800) square feet of partially constructed shoulders to be completed by the Contractor as required by the Plans and Specifications.

Section 5—Reinforcing Steel.

The work remaining to be done consists of the furnishing and placing of "Reinforcing Steel" at all locations as required by the Plans and Specifications; and also includes the brushing and cleaning, straightening and otherwise adjusting to conform to the Plans and Specifications of all reinforcing steel already placed, but about which concrete has not been placed, which has been exposed to the elements, and which has become rusted or coated with dirt or other foreign material, or bent or deformed, all to conform to the Plans and Specifications, and to provide reinforcing for the completed structures.

It is estimated that there are approximately thirty-three thousand (33,000) pounds of reinforcing steel remaining to be furnished and placed in various structures on the approach highways, and approximately seven hundred ninety-four thousand (794,000) pounds of reinforcing steel remaining to be furnished and placed in the tunnels.

Section 6—Steel Structures.

The work remaining to be performed under "Steel Structures" consists of the furnishing and placing of the trusses, purlins, braces and connection bolts, which support the louver frames, between the approach walls at the portals at each end of tunnel, and the furnishing and placing, in the tunnels, as required by the Plans and Specifications, of the structural steel which has not yet been installed. The Contractor, before fabricating steel to be erected at

any location, shall make such field measurements as are necessary to ensure the proper dimensions and fit of such steel at the location where it is to be placed.

It is estimated that there are approximately one hundred forty thousand (140,000) pounds of structural steel in the supports for the louver frames.

(It is estimated that there are approximately five hundred fifty-three thousand (553,000) pounds of structural steel remaining to be furnished and placed in the tunnels which are included in "Tunnel Construction", Section Twenty-one (21) of Part IV of this Supplement.

Section 7—Concrete Structures.

The work remaining to be done for completion of "Concrete Structures" consists of the construction, as required by the Plans and Specifications, of a retaining wall on the south side of the service roadway at the West Portal; coping structures at ends of approach walls at East and West Portals; walls at Margarido Drive and Buena Vista Place; parapet walls and rails on the Landvale Overhead structures, on Landvale Viaduct and walls, and on East Portal approach walls.

It is estimated that there are approximately four hundred thirty (430) cubic yards of Class "A" concrete remaining to be placed in these structures. (Tunnel and ventilation building concrete remaining to be furnished and placed is included in Sections Twenty-one (21) and Twenty-two (22) of Part IV of this Supplement, respectively.)

Section 8—Portland Cement Concrete Pavement.

The work remaining to be done under "Portland Cement Concrete Pavement" consists of all of the eight inch (8") Portland cement concrete pavement at East and West Portals, as required by the Plans and Specifications.

It is estimated that there are approximately thirty-seven thousand seven hundred (37,700) square feet of eight inch (8") Portland cement concrete pavement remaining to be constructed. The six inch (6") Portland cement concrete pavement required by the Plans and Specifications has been completed. (Concrete pavement to be constructed in tunnels and ventilation buildings is included in the work provided for in Section Twenty-one (21) and Section Twenty-two (22) of Part IV of this Supplement, respectively.)

Section 9—Penetration Oil Macadam Pavement.

The work remaining to be done under "Penetration Oil Macadam Pavement" consists of the construction of all penetration oil macadam pavement as required by the Plans and Specifications which has not yet been constructed, and also includes repairs to previously completed penetration oil macadam pavement necessary to make the same conform to the requirements of the Plans and Specifications. Penetration oil macadam pavement has been constructed on the Tunnel Road, and on the westerly approach road from its intersection with Broadway northeasterly a distance of approximately eight hundred (800) lineal feet. Penetration oil macadam

pavement which requires repairs is located in the vicinity of the Pedestrian Underpass on the westerly approach road, and on the Tunnel Road.

It is estimated that there are approximately six hundred sixty-five thousand (665,000) square feet of penetration oil macadam pavement remaining to be constructed as required by the Plans and Specifications.

It is estimated that there are approximately eight thousand eight hundred (8,800) square feet of penetration oil macadam pavement which must be repaired to complete the same as required by the Plans and Specifications.

Section 10—Concrete Curb and Gutter.

The work remaining to be done under "Concrete Curb and Gutter" consists of the construction of the following:

Six inch (6") curb in the vicinity of Margarido Drive, Buena Vista Place, Golden Gate Avenue, and Pacific Gas and Electric Substation.

Twelve inch (12") curb in the vicinity of Sacramento Northern Railway retaining wall and in the vicinity of the East and West portals of the tunnels.

Gutter in the vicinity of Margarido Drive, Buena Vista Place, Golden Gate Avenue, Sacramento Northern Railway retaining wall, and Pacific Gas and Electric Substation.

All of said curb and gutter shall be constructed as required by the Plans and Specifications.

It is estimated that there are approximately one thousand two hundred (1,200) lineal feet of six inch (6") curb, approximately nine hundred forty-five (945) lineal feet of twelve inch (12") curb and approximately two thousand five hundred (2,500) square feet of gutter, remaining to be constructed.

Section 11—Cement Sidewalks.

The work remaining to be done under "Cement Sidewalks" consists of the construction of cement sidewalks in the vicinity of Pedestrian Underpass, Margarido Drive, Buena Vista Place, Golden Gate Avenue, Sacramento Northern Railway Retaining Walls, and the East and West portals of the tunnels as required by the Plans and Specifications.

It is estimated that there are approximately nine thousand (9,000) square feet of cement sidewalks remaining to be constructed.

Section 12—Corrugated Metal Pipe Culverts.

The work remaining to be done under "Corrugated Metal Pipe Culverts" consists of the furnishing and installing of eight inch (8") diameter corrugated metal pipe culverts for drainage purposes along the roadway approaches; twelve inch (12") diameter corrugated metal pipe culverts for drainage purposes in the vicinity of the East Portal of the tunnel; and eighteen inch (18") diameter corrugated metal pipe culverts for drainage purposes on the West approach roads, all as required by the Plans and Specifications.

Fill protectors remain to be constructed for drainage purposes on the West approach roads, as required by the Plans and Specifications.

It is estimated that there are approximately one thousand (1,000) lineal feet of eight inch (8") diameter corrugated metal pipe culvert remaining to be furnished and installed, approximately one hundred fifty (150) lineal feet of twelve inch (12") diameter corrugated metal pipe culvert remaining to be furnished and installed, and approximately five hundred (500) lineal feet of eighteen inch (18") diameter corrugated metal pipe culvert remaining to be furnished and installed.

It is estimated that there are nine (9) fill protectors remaining to be furnished and installed.

Section 13—Reinforced Concrete Pipe Culvert.

The work remaining to be done under "Reinforced Concrete Pipe Culvert" consists of the furnishing and installing of approximately one hundred ninety (190) lineal feet of twenty-four inch (24") diameter reinforced concrete pipe culvert, extra strength (X type), as provided in the Plans and Specifications, for drainage purposes in the vicinity of the West portal of the tunnels.

Section 14—Vitrified Pipe Sewers.

The work remaining to be done under "Vitrified Pipe Sewers" consists of the construction, completion and repair of manholes with standard tops, manholes with inlet tops, manholes with grating tops, storm water inlets and lamp holes.

It is estimated that the following manholes are to be furnished and installed: one (1) manhole with standard top, one (1) manhole with inlet top, three (3) manholes with grating tops, two (2) storm water inlets, Type "B", three (3) storm water inlets, Type "C"; one (1) lamphole is to be repaired.

These items are to be installed in the vicinity of the East and West portals of the tunnels and on the approach roadways, all as required by the Plans and Specifications.

All vitrified pipe required to be furnished and installed has been furnished and installed except that required in the tunnels and ventilation buildings.

Section 15—Underdrains.

The work remaining to be done under "Underdrains" consists of furnishing and installing eight inch (8") perforated corrugated metal pipe underdrains in the vicinity of the East and West portals of the tunnels and along the West approach roadways for drainage purposes, as required by the Plans and Specifications.

It is estimated that there are approximately two thousand one hundred (2,100) lineal feet of underdrains remaining to be furnished and installed.

Section 16—Piping.

The work remaining to be done under "Piping" consists of the furnishing and installing of all of the six inch (6") diameter cast iron pipe together with all fittings and accessories, as required by the Plans

and Specifications, outside the tunnels and ventilation buildings. (Piping within the tunnels and ventilation buildings is provided for in Sections Twenty-one (21) and Twenty-two (22), Part IV of this Supplement, respectively.)

It is estimated that there are approximately two thousand twenty (2,020) lineal feet of piping, cast iron, six inch (6") diameter, remaining to be furnished and installed, outside the tunnels and ventilation buildings.

Section 17—Guard Rails and Pipe Hand Rails.

The work remaining to be done under "Guard Rails and Pipe Hand Rails" consists of the construction of all guard rails required by the Plans and Specifications but not yet constructed. Seven hundred (700) lineal feet of guard rails have been constructed along the Tunnel Road. It is estimated that approximately twelve thousand (12,000) lineal feet of guard rails required by the Plans and Specifications remain to be constructed.

Pipe hand rails remain to be constructed, as required by the Plans and Specifications, on walls, in the vicinity of Golden Gate Avenue, Temescal Culvert, Pacific Gas and Electric Substation, and underpasses.

It is estimated that approximately six hundred twenty (620) lineal feet of pipe hand rail remain to be constructed.

Pipe hand rails partially completed shall be finished and completed as required by the Plans and

Specifications. All pipe hand rails already in place which have been damaged shall be repaired, or new material supplied to complete the same, all as required by the Plans and Specifications.

Section 18—Rip Rap.

The work remaining to be done under "Rip Rap" consists of the construction of rip rap structures in the vicinity of the Landvale Overhead structure as required by the Plans and Specifications.

It is estimated that there are approximately ninety (90) cubic yards of rip rap remaining to be constructed.

Section 19—Paint and Painting.

The work remaining to be done under "Paint and Painting" consists of:

(a) The painting, as required by the Plans and Specifications, of all structural steel not yet installed;

(b) The completion of the painting, as required by the Plans and Specifications, of all structural steel which has not yet received the requisite number of coats;

(c) The repainting, to the standard required by the Plans and Specifications, of all surfaces heretofore painted which have been damaged;

(d) The painting, as required by the Plans and Specifications, of all timber guard rail which has not yet been constructed; and completion of the painting of constructed timber guard rail which has not

yet received the requisite number of coats, or on which paint coats have become damaged.

The Contractor shall examine carefully and thoroughly all painted or partially painted structures, and shall satisfy himself as to conditions there existing and the amount of work remaining to be done in connection with additional coats of paint and the repainting of damaged surfaces so that same shall conform to the requirements of the Plans and Specifications.

The decision of the District Engineer as to the locations and surfaces which may require additional coats of paint or repainting of damaged surfaces at any time during the progress of the work shall be final, and no extra payment will be allowed in the event the Contractor shall claim that the amount of repainting, or completion of partially painted surfaces required by the District Engineer does not correspond with that estimated by the Contractor.

Section 20—Metal Cribbing

The work remaining to be done under "Metal Cribbing" consists of furnishing and placing of the metal cribbing in the vicinity of the Landvale Viaduct as required by the Plans and Specifications.

No metal cribbing has been furnished or installed. It is estimated that there are approximately forty-six thousand (46,000) pounds of metal cribbing to be furnished and installed.

Section 21—Tunnel Construction

"Tunnel Construction" covers the construction of tunnels complete, as required by the Plans and Specifications. Some work has been performed on every portion of the tunnels, but no portion is complete. A general description of the approximate amount of the work which remains to be done to complete the "Tunnel Construction" is as follows: (for convenience, in addition to the description of the approximate lineal feet of items of work remaining to be done, the description by Engineer's Stations of approximate location of items is also given).

1. Upgrade or South Tunnel

(a) Excavation: Four hundred forty-six (446) lineal feet, (Stations 135+79 to 140+25), of excavation remains to be performed. Two (2) drifts have been excavated through this length. The necessary maintenance and support of these drifts to prevent cave-in shall be performed by the Contractor during the progress of the excavation of this tunnel.

(b) Concrete Arch Ring: Five hundred eighty-two (582) lineal feet of concrete arch ring remains to be constructed, (Stations 134+28 to 140+10). Footings for concrete arch ring have been constructed ahead of the full ring a distance of one hundred twenty-eight (128) lineal feet, (Stations 134+28 to 135+56).

(c) Grouting: Grouting has been completed a distance of one thousand forty-seven (1,047) lineal

feet, (Stations 111+53 to 122+00), from the western end of the concrete arch ring. There remains one thousand three hundred sixteen (1,316) lineal feet, (Stations 122+00 to 134+28 and 140+10 to 140+98), of the concrete arch ring now installed around which grouting is to be placed, as required by the Plans and Specifications. Grouting around the portions of the concrete arch ring now installed, but not yet grouted, includes such clearing out, and drilling out of grout holes as is necessary to place the grouting as required by the Plans and Specifications. Grouting, as required by the Plans and Specifications, shall be placed around all portions of the concrete arch ring hereafter constructed.

(d) Ceilings and Partitions: The ceiling or partition between the fresh air duct and the exhaust air duct has been partially constructed a distance of eight hundred eighty-one (881) lineal feet from the western end of the concrete arch ring, (Stations 111+53 to 120+34). The ceiling or partition between the roadway portion of the tunnel and the exhaust air duct has been partially constructed a distance of eight hundred eighty-four (884) lineal feet, (Stations 111+53 to 120+37), from the western end of the concrete arch ring.

Structural steel hangers and supports are partially installed easterly of these locations.

Patching, finishing and painting of the surfaces of the concrete on the partially constructed portions of the ceilings and partitions remain to be done.

Gunite partitions and other partition details, and air duct bulkheads, remain to be constructed in connection with these partially constructed ceilings and partitions. Exhaust port openings have been left in partially constructed ceilings. Slides, deflectors and other details required by the Plans and Specifications remain to be installed.

Completion of these partially constructed portions and the construction of ceilings and partitions in all of the remainder of the tunnel, with all accessories, remain to be done as required by the Plans and Specifications.

(e) Side Walls and Fresh Air Flues: Side walls and fresh air flues have been partially constructed and installed a distance of eight hundred eighty-four (884) lineal feet, (Stations 111+53 to 120+37), from the western end of the concrete arch ring; these walls require surface finishing, patching and painting, and flues require cleaning out, and setting and adjusting of nozzle openings, as required by the Plans and Specifications. Air flues for two (2) adits have been partially installed.

Finishing of partially completed walls and installation of flues and construction of flues and side walls in all remaining portions of the tunnel, as required by the Plans and Specifications, remain to be done.

(f) Curbs and Sidewalks: No part of the curbs and sidewalks required for the completion of this tunnel has been constructed, and all remains to be done, as required by the Plans and Specifications.

(g) Roadway Pavement: No portion of the subgrade or roadway pavement required by the Plans and Specifications has been constructed, and all remains to be done.

(h) Drainage Structures and Conduits: No portions of the drainage structures and conduits required by the Plans and Specifications have been constructed, except drains installed back of and through the arch ring in the portion of the tunnel in which the concrete arch ring and footings have been constructed; the Contractor will be required to furnish and construct all remaining portions of drainage structures and conduits, as required by the Plans and Specifications, in the portions of this tunnel in which the concrete arch ring and footings have been constructed. In all portions of this tunnel in which the concrete arch ring and footings have not been placed, the complete drainage structures and conduits, as required by the Plans and Specifications, shall be furnished, constructed and installed by the Contractor.

(i) Water Pipes: No part of the water pipes required to be constructed in this tunnel has been constructed. The Contractor will be required to furnish and install all water pipes, cocks, plugs, adaptors and other necessary accessories, as required by the Plans and Specifications, in the entire length of this tunnel.

2. Downgrade or North Tunnel

(a) Excavation: Nine hundred sixty-two (962) lineal feet, (Stations 129+86 to 139+48), of exca-

vation remains to be performed. One (1) drift has been excavated through on the south side of this tunnel; on the north side of this tunnel a drift has been excavated a distance of approximately seven hundred eighty-two (782) lineal feet westerly from the East Portal, and a distance of approximately one hundred fifty-nine (159) lineal feet easterly from the face of the main excavation; the distance remaining unexcavated between the ends of this drift is approximately ninety-nine (99) lineal feet; the necessary maintenance and support of these drifts to prevent cave-in shall be performed by the Contractor during the progress of the excavation of this tunnel.

(b) Concrete Arch Ring: One thousand eighty-nine (1,089) lineal feet of concrete arch ring remains to be constructed, (Stations 128+50 to 139+39). Footings for concrete arch ring have been constructed ahead of the full ring a distance of one hundred and twenty-one (121) lineal feet, (Stations 128+50 to 129+71).

(c) Grouting: Grouting has been completed a distance of one thousand one hundred and seven (1,107) lineal feet, (Stations 111+43 to 122+50), from the western end of the concrete arch ring. There remains six hundred seventy-nine (679) lineal feet, Stations 122+50 to 128+50 and 139+39 to 140+18), of the concrete arch ring now installed around which grouting is to be placed, as required by the Plans and Specifications. Grouting around

the portions of the concrete arch ring now installed, but not yet grouted, includes such clearing out, and drilling out of grout holes as is necessary to place the grouting as required by the Plans and Specifications. Grouting, as required by the Plans and specifications, shall be placed around all portions of the concrete arch ring hereafter constructed.

(d) Ceilings and Partitions: The ceiling or partition between the fresh air duct and the exhaust air duct has been partially constructed a distance of eight hundred seventy-three (873) lineal feet from the western end of the concrete arch ring, (Stations 111+43 to 120+16). The ceiling or partition between the roadway portion of the tunnel and the exhaust air duct has been partially constructed a distance of eight hundred eighty-four (884) lineal feet, (Stations 111+43 to 120+27), from the western end of the concrete arch ring.

Structural steel hangers and supports are partially installed easterly of these locations.

Patching, finishing and painting of the surfaces of the concrete on the partially constructed portions of ceilings and partitions remain to be done.

Gunite partitions and other partition details, and air duct bulkheads, remain to be constructed in connection with these partially constructed ceilings and partitions. Exhaust port openings have been left in partially constructed ceilings. Slides, deflectors and other details required by the Plans and Specifications remain to be installed.

Completion of these partially constructed portions and the construction of ceilings and partitions

in all of the remainder of the tunnel, with all accessories, remains to be done, as required by the Plans and Specifications.

(e) Side Walls and Fresh Air Flues: Side walls and fresh air flues have been partially constructed and installed a distance of eight hundred eighty-four (884) lineal feet, (Stations 111+43 to 120+27), from the western end of the concrete arch ring; these walls require surface finishing, patching and painting; and flues require cleaning out, and setting and adjustment of nozzle openings, as required by the Plans and Specifications.

Finishing of partially completed walls and installation of flues and construction of flues and side walls in all remaining portions of the tunnel, as required by the Plans and Specifications, remain to be done.

(f) Curbs and Sidewalks: No part of the curbs and sidewalks required for the completion of this tunnel has been constructed, and all remains to be done, as required by the Plans and Specifications.

(g) Roadway Pavement: No portion of the subgrade or roadway pavement required by the Plans and Specifications has been constructed, and all remains to be done.

(h) Drainage Structures and Conduits: No portions of the drainage structures and conduits required by the Plans and Specifications have been constructed, except drains installed back of and through the arch ring in the portion of the tunnel

in which the concrete arch ring and footings have been constructed; the Contractor will be required to furnish and construct all remaining portions of drainage structures and conduits, as required by the Plans and Specifications, in the portions of this tunnel in which the concrete arch ring and footings have been constructed. In all portions of this tunnel in which the concrete arch ring and footings have not been placed, the complete drainage structures and conduits, as required by the Plans and Specifications, shall be furnished, constructed and installed by the Contractor.

(i) Water Pipes: No part of the water pipes required to be constructed in this tunnel has been constructed. The Contractor will be required to furnish and install all water pipes, cocks, plugs, adaptors and other necessary accessories, as required by the Plans and Specifications, in the entire length of this tunnel.

3. Gross Adits

The two (2) most westerly "Cross Adits" of the three (3) required by the Plans and Specifications have been completed. Excavation for the third cross adit has been started from the South or Upgrade Tunnel and the excavation has proceeded approximately fifteen (15) lineal feet toward the North or Downgrade Tunnel. The Contractor is required to complete this adit as required by the Plans and Specifications.

4. Completion of Tunnels

The tunnels shall be completed in every detail, as required by the Plans and Specifications. Schedule A, Schedule B and Schedule C hereinbefore set forth in Part II, of this Supplement, provide for the performance of this work. The general description of work remaining to be constructed and completed, as hereinabove set forth, is approximate only. The Contractor under any Schedule shall perform all work, furnish all labor, materials, tools and equipment necessary and incidental to the completion of work now partially constructed and for the execution of all work required for the completion of the various elements of "Tunnel Construction" which have not yet been constructed, all as required by the Plans and Specifications and included in such Schedules. The omission herein of specific mention of any detail, item, or quantity shall not relieve the Contractor of his responsibility and obligation to perform all labor and furnish all materials of each and every kind necessary, and to construct, complete and finish the various elements of these tunnels included in the Schedules therefor, in every detail as required by the Plans and Specifications; all of this is to be done without other payment therefor than the prices bid for "Tunnel Construction", under each Schedule as hereinbefore provided.

5. Payment

The prices bid and the prices to be paid by the District to complete "Tunnel Construction" under Schedule A, Schedule B and Schedule C shall constitute full compensation to the Contractor for the completion of "Tunnel Construction", including "Cross Adit", as required by the Plans and Specifications, under each of said Schedules respectively, except that "Reinforcing Steel" furnished and installed under Schedule A and Schedule C shall be paid for per pound in place, as provided in the Specifications.

Section 22—Ventilation Buildings

The "Ventilation Buildings" required by the Plans and Specifications to be constructed at the eastern and western ends of the tunnel are partially constructed.

The Contractor shall complete the ventilation buildings in every detail as required by the Plans and Specifications. The Contractor shall perform all work, furnish all labor, materials, tools and equipment necessary and incidental to the repair and refinishing of work now in place, and required for the completion of the construction of these buildings in accordance with the Plans and Specifications.

The roofing over the fan room of the West ventilation building has been damaged and was rejected by the District prior to the abandonment of the work by the former contractor. The Contractor

who completes the work shall completely reconstruct this roofing, damaged roofing to be removed and new roofing to be furnished and constructed in accordance with the Plans and Specifications. The Contractor shall patch and repair defective or damaged wall surfaces and all other portions of said structures before painting.

The Contractor who completes the work shall construct, supply and furnish roadway pavement, curbs, sidewalks and all accessories in the ventilation buildings all as required by the Plans and Specifications.

The foregoing general description of the work remaining to be done, constructed and completed, as hereinabove set forth, is approximate only and, in particular, does not include a complete statement of the repairs and refinishing that will be required to complete the structures as left in place by the contractor who abandoned the work on this project. The omission herein of specific mention of any detail, item or quantity shall not relieve the Contractor of his responsibility and obligation to provide all labor, tools, equipment, and materials of each and every kind necessary to construct, complete and finish the ventilation buildings in every detail as required by the Plans and Specifications. All of this is to be done without other payment therefor than the price bid for "Completion of Ventilation Buildings".

Section 23—Ventilation Equipment

The "Ventilation Equipment" required by the Plans and Specifications to be furnished and installed in the ventilation buildings at the eastern and western ends of the tunnel has been partly furnished and installed.

The Contractor is required to furnish and install all of the remainder of the ventilation equipment in both of the said buildings in every detail, as required by the Plans and Specifications, and the Contractor shall perform all work and furnish all labor, tools, material, equipment and accessories necessary to complete the installation of the ventilation equipment strictly in accordance with the requirements of the Plans and Specifications.

The Contractor shall make a detailed examination of the ventilation equipment now on the project and shall satisfy himself as to the amount and existing conditions thereof, and as to the amount of material, equipment and accessories remaining to be furnished, and work remaining to be done; and, in addition to furnishing all labor, tools, materials, equipment and accessories necessary to complete the same, the Contractor shall make all necessary repairs and adjustments to the portions of the ventilation equipment now in place, including cleaning and relubricating bearings, and do all things necessary in order that, at the completion of the Contract, the ventilation equipment shall be complete in every respect, and shall meet

all of the requirements and tests set forth in the Plans and Specifications.

Section 24—Mechanical Equipment

The "Mechanical Equipment" required by the Plans and Specifications to be furnished and installed on the project of the District has been partly furnished and installed.

The Contractor is required to furnish and install all of the remainder of the mechanical equipment on the project in every detail, as required by the Plans and Specifications, and the Contractor shall perform all work and furnish all labor, tools, material, equipment and accessories necessary to complete the installation of the mechanical equipment strictly in accordance with the requirements of the Plans and Specifications.

The Contractor shall make a detailed examination of the mechanical equipment now on the project, and shall satisfy himself as to the amount and existing conditions thereof, and as to the amount of material, equipment and accessories required to be furnished, and work remaining to be done; and, in addition to furnishing all labor, tools, materials, equipment and accessories necessary to complete the same, the Contractor shall make all necessary repairs and adjustments to the portions of the mechanical equipment now in place, and do all things necessary in order that, at the completion of the Contract, the mechanical equipment shall be complete in every respect, and shall meet all of the re-

quirements and tests set forth in the Plans and Specifications.

Section 25—Electrical Equipment

The "Electrical Equipment" required by the Plans and Specifications to be furnished and installed on the project of the District has been partly furnished and installed. The completion of the electrical equipment has been divided into Schedule C, Schedule D, and Schedule E.

The Contractor under each Schedule last above mentioned is required to furnish and install all of the remainder of the electrical equipment included in the Schedule for which he is awarded a Contract, in every detail, as required by the Plans and Specifications, and shall perform all work and furnish all labor, tools, material, equipment and accessories necessary to complete the installation of such electrical equipment strictly in accordance with all the requirements of the Plans and Specifications.

The Contractor shall make a detailed examination of the electrical equipment now on the project, and shall satisfy himself as to the amount and existing conditions thereof, and as to the amount of material, equipment and accessories required to be furnished, and work remaining to be done under the Schedule upon which he bids; and, in addition to furnishing all labor, tools, materials, equipment and accessories necessary to complete the same, the Contractor shall make all necessary repairs and

adjustments to the portions of the electrical equipment now in place, and do all things necessary in order that, at the completion of the Contract awarded to him, the electrical equipment included therein shall be complete in every respect, and shall meet all of the requirements and tests set forth in the Plans and Specifications.

Section 26—Carbon Monoxide Detectors and Recorders

The "Carbon Monoxide Detectors and Recorders" shall be furnished and installed, as required by the Plans and Specifications.

No part of this equipment has been furnished or installed.

Section 27—Repairing Damage and Imperfect Work and Drainage, on Highway Construction and Appurtenant Structures

The Contractor to whom a Contract is awarded to perform the work included in Schedule G shall perform all work, furnish all labor, tools, materials and equipment necessary for finishing and completing all parts of the work on the highway approaches and appurtenant structures in every detail, as required by the Plans and Specifications.

Without limiting the generality of the foregoing, and as a general description of the work required to be done in repairing damaged and imperfect work on said portions of the project, the Contractor shall perform all work and furnish all labor, tools,

material and equipment necessary to repair and complete the partially constructed shoulders hereinbefore mentioned, to repair penetration oil macadam pavement hereinbefore mentioned, to complete and repair curbs and gutters previously constructed so as to make the same conform to the Plans and Specifications, to brush, clean, straighten and otherwise adjust exposed reinforcing steel as hereinbefore mentioned, to repair the lamphole hereinbefore mentioned, to complete partially completed pipe hand rails and repair damaged pipe hand rails hereinbefore mentioned, to complete the paint and painting, of work included in Schedule G, to clean out all culverts and drainage channels which have become blocked or otherwise obstructed in any manner during previous construction operations or during Contractor's operations, and to maintain and keep the same clear at all times during construction as a part of the work to be performed under the Contract awarded under said Schedule G. All of the work described in this section of Part IV hereof, is to be performed by the Contractor in a manner, and with the purpose that all parts of the work included in Schedule G hereof, shall be completed in accordance with the requirements of the Plans and Specifications.

The price bid for "Repairing Damage and Imperfect Work and Drainage, on Highway Construction and Appurtenant Structures" shall constitute full compensation to the Contractor for the furnish-

ing of all labor, tools, material and equipment and the performance of all work necessary or incidental to the completion of the above described work.

PART V—PAYMENTS

(a) Partial Payments

Payments will be made only upon the certificate of the District Engineer for work actually performed. The District Engineer shall measure the work on or about the first day of each month and at the time of the completion of the work, and shall render a certificate on or about the tenth day of each month and at the completion of the work, stating the amount of work performed during the previous calendar month, and during the current month, at the time of completion. The Contractor shall then, at the times above specified, be entitled to receive a payment from the District in the amount of seventy-five percent (75%) of the amount specified in said District Engineer's certificate, provided that no such estimate or payment shall be required to be made when, in the judgment of the District Engineer, the work is not proceeding in accordance with the provisions of the contract, or when, in his judgment, the total value of the work done since the last estimate amounts to less than Five Hundred Dollars ($500.00), except the certificate and payment required at the completion of the entire work.

The acceptance by the Contractor of the final seventy-five percent (75%) payment for the completed work shall be and shall operate as a release

to the District from all claims and liability to the Contractor for anything done or furnished for or relating to the work, or for any act or neglect of the District or its agent in any way affecting the work, excepting the claim of the Contractor against the District for the moneys herein provided to be paid by the District to the Contractor thirty-five (35) days after the acceptance of the contract.

(b) Final Payments.

Thirty-five (35) days after the acceptance of the work by a certificate of acceptance duly rendered by the District Engineer and final approval and acceptance by the Board of Directors of the District, the Contractor shall be entitled to receive a payment of the balance due under this contract in the amount of twenty-five percent (25%) of the aggregate amount of all certificates of the District Engineer.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. No. X-11. Filed June 1, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT X-111

Schedule Showing Computed Total Cost of Construction of Project Based on Unit Prices Set Forth in Contract Dated June 4, 1934, Between Six Companies of California and Joint Highway District No. 13 of the State of California, and Units of Work Performed Under All Contracts.

No.	Items	Quantities by Estimate No. 25 Six Companies of California	Quantities—Total Six Companies of California and Schedules A, B, C, D, E, F, G and H	Units	Six Companies of California Contract Prices	Amounts at Six Companies of California Contract Prices
1	Grading	807,032	865.370	Cu. Yds.	0.33	$ 285,572.10
2	Overhaul	4,586,272	5,716,795	Sta. Yds.	0.005	28,583.98
3	Structural Excavation—Class "A"	37,767	39,062.89	Cu. Yds.	1.20	46,875.47
4	Structural Excavation—Class "B"	361	361	Cu. Yds.	2.00	722.00
5	Shoulders	5,400	224,803	Sq. Ft.	0.035	7,868.11
6	Reinforcing Steel	3,739,949	4,719,214	Lbs.	0.04	188,768.56
7	Structural Steel	270,307	424,112	Lbs.	0.05	21,205.60
8	Concrete Structures—Class "A" Concrete	12,608	13,032.77	Cu. Yds.	15.50	202,007.94
9	Concrete Structures—Class "B" Concrete	1,223.1	1,223.1	Cu. Yds.	14.50	17,734.95
10	Portland Cement Concrete Pavement—8 inch	—	30,760	Sq. Ft.	0.24	7,382.40
11	Portland Cement Concrete Pavement—6 inch	31,101	31,101	Sq. Ft.	0.18	5,598.18
12	Asphalt Concrete	42,609	42,609	Sq. Ft.	0.08	3,408.72
13	Penetration Oil Macadam Pavement	80,000	745,612.30	Sq. Ft.	0.14	104,385.72
14	Concrete Curbs—6 inch	3,391	4,654.88	Lin. Ft.	0.35	2,420.54

DEFENDANT'S EXHIBIT X-111 (Continued)

No.	Items	Quantities by Estimate No. 25 Six Companies of California	Quantities—Total Six Companies of California and Schedules A, B, C, D, E, F, G and H	Units	Six Companies of California Contract Prices	Amounts at Six Companies of California Contract Prices
15	Concrete Curbs—12 inch	—	1,023.50	Lin. Ft.	0.80	818.80
16	Concrete Curbs—6 inch with guard	40	40	Lin. Ft.	1.00	40.00
17	Concrete Gutters	3,842	6,917.93	Sq. Ft.	0.25	1,729.48
18	Cement Sidewalks	10,454	21,232	Sq. Ft.	0.13	2,760.16
19	Fill Protectors	6	13	Each	19.00	247.00
20	Corrugated Metal Pipe Culvert—8 inch	736	1,587	Lin. Ft.	1.30	2,063.10
21	Corrugated Metal Pipe Culvert—12 inch	478	742	Lin. Ft.	2.00	1,484.00
22	Corrugated Metal Pipe Culvert—18 inch	1,046	2,171	Lin. Ft.	3.00	6,513.00
23	Reinforced Concrete Pipe Culvert—10 inch "S"	154	154	Lin. Ft.	1.20	184.80
24	Reinforced Concrete Pipe Culvert—12 inch "S"	753	753	Lin. Ft.	1.50	1,129.50
25	Reinforced Concrete Pipe Culvert—15 inch "S"	395	395	Lin. Ft.	1.80	711.00
26	Reinforced Concrete Pipe Culvert—18 inch "S"	—	—	Lin. Ft.	2.00	—
27	Reinforced Concrete Pipe Culvert—24 inch "X"	1,326	1,831	Lin. Ft.	4.40	8,056.40

DEFENDANT'S EXHIBIT X-111 (Continued)

No.	Items	Quantities by Estimate No. 25 Six Companies of California	Quantities—Total Six Companies of California and Schedules A, B, C, D, E, F, G and H	Units	Six Companies of California Contract Prices	Amounts at Six Companies of California Contract Prices
28	Reinforced Concrete Pipe Culvert—36 inch "X"	579	579	Lin. Ft.	8.50	4,921.50
29	Vitrified Pipe Sewers—6 inch	235	235	Lin. Ft.	1.00	235.00
30	Vitrified Pipe Sewers—8 inch	215	215	Lin. Ft.	1.20	258.00
31	Manholes—Standard Tops	10	13	Each	90.00	1,170.00
32	Manholes—Inlet Tops	4	5	Each	100.00	$ 500.00
33	Manholes—Grating Tops	3	13	Each	90.00	1,170.00
34	Storm Water Inlets—34 inch openings	1	1	Each	75.00	75.00
35	Storm Water Inlets—"B"	4	6	Each	100.00	600.00
36	Storm Water Inlets—"C"	8	12	Each	80.00	960.00
37	Lamp Holes—6 inch	2	2	Each	24.00	48.00
38	Lamp Holes—8 inch	1	1	Each	26.00	26.00
39	Lamp Holes—12 inch	3	3	Each	36.00	108.00
40	Hand Hole	2	2	Each	30.00	60.00
41	Underdrains—8 in. perf. corrug. metal pipe	3,360	5,709	Lin. Ft.	1.40	7,992.60
42	Piping, Cast Iron—6 inch	—	1,662	Lin. Ft.	1.50	2,493.00
43	Guard Rail	653	5,336	Lin. Ft.	0.80	4,268.80

DEFENDANT'S EXHIBIT X-111 (Continued)

DEFENDANT'S EXHIBIT X-111 (Continued)

No.	Items	Quantities by Estimate No. 25 Six Companies of California	Quantities—Total Six Companies of California and Schedules A, B, C, D, E, F, G and H	Units	Six Companies of California Contract Prices	Amounts at Six Companies of California Contract Prices
44	Pipe Hand Rail	609	1,265.40	Lin. Ft.	3.00	3,796.20
45	Riprap	128	216.80	Cu. Yds.	5.00	1,084.00
46	Metal Cribbing	—	34,851	Lbs.	0.13	4,530.63
47	Stone or Gravel for Foundations	337	337	Cu. Yds.	3.00	1,011.00
48	Tunnel Construction—Type "A"	4,004.60	5,816.39	Lin. Ft.	325.00	1,890,326.75
49	Tunnel Construction—Type "B"	—	—	Lin. Ft.	400.00	—
50	Cross Adits	199	322	Lin. Ft.	40.00	12,880.00
51	Ventilation Buildings—West and East Bldgs., Complete	89.4 %	100%	Lump Sum	340,000.00	340,000.00
52	Ventilation Equipment—Furn. and Install. Complete	52.06%	100%	Lump Sum	160,000.00	160,000.00
53	Mechanical Equipment—Furn. and Install. Complete	12.00%	100%	Lump Sum	60,000.00	60,000.00
54	Electrical Equipment—Furn. and Install. Complete	19.73%	100%	Lump Sum	210,000.00	210,000.00
55	Carbon Monoxide Detectors and Recorders—Furnishing and Installing Complete	—	100%	Lump Sum	15,000.00	15,000.00
	Total					$3,671,785.99

DEFENDANT'S EXHIBIT X-113

JOINT HIGHWAY DISTRICT #13
OF THE STATE OF CALIFORNIA

COST ATTRIBUTABLE TO CESSATION
OF WORK BY SIX COMPANIES OF CALIFORNIA

June 13, 1936, to November 9, 1936.

Protection and Maintenance:			
Materials, Supplies and Expense	—Schedule A-3	$19,769.48	
Engineering Services	—Schedule B-1	4,810.19	
Watchmen, Fire Bosses and Labor as per summary at foot of	—Schedule B-2	23,364.66	
Total—Protection and Maintenance			$47,944.33
Measuring Work and Completing Specifications:			
Materials, Supplies and Expense	—Schedule A-3	$ 1,442.78	
Services Measuring Work	—Schedule B-3	3,639.79	
Services Completing Specifications	—Schedule B-3	51.65	
Total—Measuring Work and Completing Specifications			5,134.22
Re-Advertising:			
Cost of Publication of Advertising	—Schedule A		1,862.45
Insurance:			
Cost of Fire, Explosion, Liability, Fidelity and Workmen's Compensation Insurance	—Schedule A		14,060.85
Total Costs—Above			$69,001.85

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA — SCHEDULE A-1

Detail of Charges for Material and Supplies, and Services Other Than Labor, Occasioned by Cessation of Work by Six Companies of California. June 13, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Voucher	Amount Charged Elsewhere	Amount Charged Herein	Protection to, and Maintenance of Property	Measuring Work and Completing Specifications	Readvertising	Insurance Costs
	June, 1936, Vouchers								
1159	National Lead Company	Outside Paint and Wall Brushes	14.68		14.68	14.68			
1169	Maxwell Wholesale Hardware Company	Reflectors, Lanterns, Globes, and Oil	55.04	3.20	51.84	51.84			
1170	Plant Rubber & Asbestos Works	Fine White Hydraulic Packing	4.82		4.82	4.82			
	July, 1936, Vouchers								
1185	Hamilton Signs	6-10"x3' Board Signs	6.00		6.00	6.00			
1215	California Wire Cloth Co.	4' Steel Wire Cloth 1" sp #4 48"	10.44		10.44	10.44			
1216	Kronke-Brampton Co.	1-34'x48' Tarpaulin	95.58		95.58	95.58			
1218	Bethlehem Steel Company	532 Steel Bars for Gunite Reinforcing	270.67		270.67	270.67			
1219	E. D. Bullard Company	8–Respirators & 4 Pr. Goggles	33.37		33.37	33.37			
1225	Oakland Blue Print Co.	20 Sets Blue Prints Complete Plans	668.48	9.07	659.41		659.41		
1228	DuFrane Machine & Engine Works, Inc.	Repairs to Equipment	5.00		5.00	5.00			
1230	New Claremont Garage	Repairs to Motor on Mixer	6.50		6.50	6.50			
1233	Transit Concrete, Ltd.	Gunite Sand, Cement	2,795.68		2,795.68	2,795.68			
1239	Charles S. Hughes Co.	Cement	3,484.87		3,484.87	3,484.87			
1240	Maxwell Wholesale Hardware Company	Urban Paper, Lantern Wicks, Bolts, Etc.	6.73	3.50	3.23	3.23			
1241	Associated Oil Company	Kerosene & Hi Pres Grease	31.08	16.97	14.11	14.11			
1242	Associated Oil Company	Kerosene & Oil	20.20		20.20	20.20			
	August, 1936, Vouchers								
1263	DeFrane Machine & Engine Works, Inc.	Straighten Turnbuckle Units, Etc.	4.00		4.00	4.00			
1270	Tilden Lumber Company	500, 2x4–12" O. P. Wedges	17.32		17.32	17.32			
1275	Cement Gun Construction Co.	Equipment Rental and Services	718.18		718.18	718.18			
1287	The Tribune Press	150 Books (Specifications)	669.50		669.50		669.50		
1300	Pacific Pumping Company	Rent & Service Pump Equipment	63.00		63.00	63.00			
1312	The Tribune Press	200 Copies Legal Ad. of 8/28/36	5.92		5.92			5.92	
	September, 1936, Vouchers								
1318	Six Companies of California	Water Charge and Rent of Equipment	3,545.71		3,545.71	3,545.71			
1323	Six Companies of California	Water Charge 7/28/36–8/27/36	80.94		80.94	80.94			
1325	Pacific Gas & Electric Co.	Light and Power	1,611.78		1,611.78	1,611.78			
1332	Six Companies of California	Small Tools and Equipment)			169.92	169.92			
		Materials and Supplies)			129.35	129.35			
		Equipment Rental)	1,146.29		847.02	847.02			
1334	The Tribune Publishing Co.	Notice to Contractors—1 Time)			49.05			49.05	
		Notice to Contractors—3 Times)	184.35		135.30			135.30	
1346	Pacific Pumping Company	Rent of Pumping Equipment	90.00		90.00	90.00			
	October, 1936, Vouchers								
1362	United Iron Works	1–30" Chisel—2" Cutting Edge	3.60		3.60	3.60			
1365	The Inter-City Printing Co.	100 Sets Proposal Sheets)		24.67					
		500 Sets Supplement to Specifications)	138.54		113.87		113.87		
1367	Tilden Lumber Company	1000 2x4–12" O. P. Wedges	26.50		26.50	26.50			
1370	W. H. Parrish Co.	Hauling Timbers West to East Portal	20.25		20.25	20.25			
1372	The Tribune Publishing Co.	Notice to Contractors—3 Times	130.50		130.50			130.50	

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA — SCHEDULE A-2

Detail of Charges for Material and Supplies, and Services Other Than Labor, Occasioned by Cessation of Work by Six Companies of California. June 13, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Voucher	Amount Charged Elsewhere	Amount Charged Herein	Protection to, and Maintenance of Property	Measuring Work and Completing Specifications	Readvertising	Insurance Costs
	Totals Brought Forward		15,965.52	57.41	15,908.11	14,144.56	1,442.78	320.77	
1378	Henry Cowell Lime and Cement Co.	Top Sand & Gravel to East Portal	44.87		44.87	44.87			
1381	Six Companies of California	Rent of Water System, $150.00, and of Electric Plant, $450.00, Less Return of Small Tools and Supplies, $28.91	571.09		571.09	571.09			
1382	Six Companies of California	Water Used Aug. 27th to Sept. 29th	47.34		47.34	47.34			
1401	Pacific Pumping Company	Rent of Pumping Equipment	93.00		93.00	93.00			
	November, 1936, Vouchers								
1414	California Concrete Products Co.	24-Ft. 12" T & G Concrete Pipe	18.54		18.54	18.54			
1415	Herb Dana	Fire and Explosion Insurance	2,520		2,520.00				2,520.00
1417	Herb Dana	Fire and Explosion Insurance	3,820.00		3,820.00				3,820.00
1420	Herb Dana	P. L. & C. L. Insurance	300.00		300.00				300.00
1433	Six Companies of California	October Rental Water & Electric System	620.00		620.00	620.00			
	December, 1936, Vouchers								
1450	Pacific Gas & Electric Co.	Light and Power Aug. 1st to Nov. 11th	1,931.56		1,931.56	1,931.56			
1451	Fredrickson & Watson Constr. Co.	Slurry Base, Screenings & Asphalt Emulsion—Detour at East Portal	1,48.18		1,408.18	1,408.18			
1459	Pacific Pumping Company	November Rent of Pump Equipment	27.00		27.00	27.00			
1466	Six Companies of California	Water Charge	70.41		70.41	70.41			
1467	Six Companies of California	November Rent of Water & Electric Systems)			200.00	200.00			
		Small Tools and Supplies)	200.96		.96	.96			
1470	The Tribune Publishing Co.	Notice to Contractors—Nov. 16, 23 & 30)			136.17				
		Notice to Contractors—Nov. 20, 27 & Dec. 4)			136.17				
		Notice to Contractors—Nov. 25 & Dec. 5 & 12)	415.26		142.92			415.26	
1471	The Post Enquirer	Notice to Contractors—Nov. 20, 27 & Dec. 4)			179.67				
		Notice to Contractors—Nov. 25 & Dec. 5 & 12)	365.28		185.61			365.28	
1506	Maxwell Wholesale Hardware Company	Lanterns and Ruby Globes	23.18	6.80	16.38	16.38			
	January, 1937, Vouchers								
1513	State Compensation Fund	Compensation Insurance 11/21/35-11/21/36	4,544.24	1,957.16	2,587.08				2,587.08
1522	Associated Oil Company	Kerosene	40.45	28.75	11.70	11.70			
	February, 1937, Vouchers								
1560	The Post Enquirer	Notice to Contractors Jan. 14, 21 & 26)			177.66				
		100 Copies of Notices)	180.75		3.09			180.75	
1561	The Tribune Publishing Co.	Notice to Contractors Jan. 14, 21, & 26 and 100 copies of Notice	140.67		140.67			140.67	
1568	Fredrickson & Watson Construction Co.	Asphalt Emulsion in Place	76.82		76.82	76.82			
1594	Herb Dana	P. L. and C. L. Insurance	233.94		233.94				233.94
	March, 1937, Vouchers								
1609	Herb Dana	Liability Insurance	100.00		100.00				100.00
1617	The Tribune Publishing Co.	Notice to Contractors Feb. 18 & 25th	93.67		93.67			93.67	
1648	The Tribune Publishing Co.	Notice to Contractors Mar. 19 & 26th	94.17		94.17			94.17	

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

SCHEDULE A-3

Detail of Charges for Material and Supplies, and Services Other Than Labor, Occasioned by Cessation of Work by Six Companies of California. June 13, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Voucher	Amount Charged Elsewhere	Amount Charged Herein	Protection to, and Maintenance of Property	Measuring Work and Completing Specifications	Readvertising	Insurance Costs
	Totals Brought Forward		33,946.90	2,050.12	31,896.78	19,282.41	1,442.78	1,610.57	9,561.02
	April, 1937, Vouchers								
1668	The Post Enquirer	Notice to Contractors Feb. 18 & 25th)			153.12				
		100 Printed Slips)	156.21		3.09			156.21	
1669	The Tribune Publishing Co.	Notice to Contractors, April 1 & 8th	95.67		95.67			95.67	
1672	Herb Dana	Public Liability Insurance	1,129.52		1,129.52				1,129.52
	July, 1937, Vouchers								
1819	Herb Dana	Fire and Explosion Insurance	392.32		392.32				392.32
1835	Herb Dana	P. L. and C. L. Insurance	1,351.54		1,351.54				1,351.54
	September, 1937, Vouchers								
1935	Herb Dana	P. L and C. L. Insurance	300.00		300.00				300.00
	October, 1937, Vouchers								
1969	Herb Dana	P. L. and C. L. Insurance	388.21		388.21				388.21
1980	Cement Gun Construction Co.	Removal of Concrete & Gunite Work	487.07		487.07	487.07			
2009	Herb Dana	Fire and Explosion Insurance	10.74		10.74				10.74
	December, 1937, Vouchers								
2091	Herb Dana	Fire and Explosion Binder	448.18		448.18				448.18
2117	Herb Dana	P. L. and C. L. Insurance 9/25/37-12/5/37	479.32		479.32				479.32
	Totals		39,185.68	2,050.12	37,135.56	19,769.48	1,442.78	1,862.45	14,060.85

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA

SCHEDULE B-1

Detail of Engineering Services on Maintenance—
From Monthly Pay Rolls

Services at Tunnel:	Month During Which Services Rendered—All During 1936					
	November	October	September	August	July	June
1	8.00	27.38	30.62	32.16	38.74	
2	29.00	34.78	48.66	12.00	50.74	
3	29.00	18.12	48.66	36.16	67.19	
4	29.00		42.16	36.16	26.54	
5	29.00	27.38	46.11	28.16	8.00	
6	29.00	27.38	12.00	28.16	53.74	
7	45.00	34.78	20.62	28.16	53.74	
8	12.00	34.78	50.36	36.16	53.74	
9	45.00	27.38	28.16	19.00	61.44	
10		27.38	42.66	28.16	61.44	
11		12.00	28.16	28.16	52.12	
12		16.26	35.41	61.16	16.00	
13		16.26	12.00	61.16	53.74	
14		37.38	28.16	61.16	61.74	
15		27.38	28.16	45.41	56.49	18.54
16		27.38	36.16	12.00	61.74	26.54
17		27.38	28.16	44.54	53.74	36.16
18		12.00	36.16	36.54	53.74	18.54
19		27.38	32.16	44.54	16.00	28.16
20		34.78	12.00	25.75	36.16	28.16
21		34.78	28.16	33.00	48.66	8.00
22		34.78	28.16	22.75	36.16	57.1
23		34.78	28.16	13.50	36.16	54.1
24		34.78	28.16	29.00	36.16	49.1
25		12.00	28.16	31.00	32.16	54.16
26		27.38	28.16	33.00	16.00	37.62
27		34.78	12.00	33.00	36.16	16.62
28		34.78	28.16	33.00	36.16	12.00
29		34.78	35.86	22.75	36.16	16.62
30		34.78	28.16	12.00	36.16	
31		41.03		37.12	36.16	
Totals	255.00	846.21	919.68	1,004.82	1,322.88	461.60

The above supported by daily time reports covering the monthly pay roll of the engineering staff.

The above total $4,810.19, summarized as follows:

Month of June, 1936	461.60
Month of July, 1936	1,322.88
Month of August, 1936	1,004.82
Month of September, 1936	919.68
Month of October, 1936	846.21
Month of November, 1936	255.00
Total	4,810.19

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Detail of Charges for Services—Watchmen—From Monthly Pay Roll

Date of Service:	Daily Total	Grand Total
June 19, 1936	18.42	
20	41.22	
22	17.50	
24	18.72	
26	12.50	108.36
July 20, 1936	8.00	
21	8.00	
22	8.00	
23	8.00	
24	8.00	
25	3.85	
26	8.00	
27	7.70	
28	7.70	
29	7.70	
30	7.70	
31	7.70	90.35

August 1, 1936	7.70	
3	7.70	
4	7.70	
5	7.70	
6	7.70	
7	7.70	
8	7.70	
9	7.00	
10	8.00	
23	6.00	
30	6.00	
31	7.00	87.90
September 6, 1936	6.00	
7	16.62	
12	10.58	33.20
Total—Watchmen—From Monthly Pay Roll		319.81
Superintendence—From Monthly Pay Roll:		
Month of July	600.00	
Month of August	600.00	
Month of September	600.00	
Month of October	300.00	
Total—Superintendence—From Monthly Pay Roll		2,100.00

SCHEDULE B-2

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA

Detail of Charges for Services Rendered—From Weekly Pay Roll

From Weekly Pay Roll:		Totals	Watchmen	Fire Bosses	Tunnel Maintnce.	East Portal Drain	Margaride Drive
Week Ending:	Checks Issued						
6/20/36	#1937-1964	578.36	177.00	161.56	239.80		
6/27/36	2020-2050	734.84	320.50	242.34	172.00		
7/ 4/36	2059-2170	2,283.81	304.50	201.95	1,777.36		
7/11/36	2202-2304	2,787.00	251.50	242.34	2,293.16		
7/18/36	2313-2408	2,978.15	248.00	242.34	2,487.81		
7/25/36	2418-2457	1,126.92	209.50	242.34	675.08		
8/ 1/36	2510-2531	806.52	206.50	242.34	357.68		
8/ 8/36	2557-2578	814.52	206.50	242.34	365.68		
8/15/36	2580-2600	816.52	246.50	242.34	327.68		
8/22/36	2601-2623	829.12	253.50	242.34	333.28		
8/29/36	2672-2688	676.52	254.50	242.34	179.68		
9/ 5/36	2714-2729	625.34	259.00	242.34	124.00		
9/12/36	2731-2746	631.34	265.00	242.34	124.00		
9/19/36	2764-2779	631.34	265.00	242.34	124.00		

From Weekly Pay Roll:		Totals	Watchmen	Fire Bosses	Tunnel Maintnce.	East Portal Drain	Margarido Drive
9/26/36	2785-2799	570.84	273.00	242.34		55.50	
10/ 3/36	2844-2862	692.84	273.00	242.34	122.00	55.50	
10/10/36	2873-2892	726.44	273.00	242.34	140.00	71.10	
10/17/36	2893-2913	720.84	266.00	242.34	112.00	100.50	
10/24/36	2920-2936	615.84	273.00	242.34		100.50	
10/31/36	2970-2986	575.45	273.00	201.95		100.50	
11/ 7/36	3021-3036	569.50	224.00	245.00			100.50
11/ 9/36	3037-3052	152.80	56.00	70.00			26.80
Totals—From Weekly Pay Roll		20,944.85	5,378.50	5,000.24	9,955.21	483.60	127.30

Summarizing the charges for all services rendered to the 9th day of November, 1936 and summarized above and on the sheet opposite hereto, the following is offered:

Services of Superintendence	$ 2,100.00
Services of Watchmen	5,698.31
Services of Fire Bosses	5,000.24
Services at East Portal Drain	483.60
Services at Margarido Drive	127.30
Services—Other Labor at Tunnel	9,955.21
Total	23,364.66

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA

SCHEDULE B-3

Detail of Engineering Services—Measuring Work—
From Monthly Pay Rolls

Services Rendered at Tunnel:	Months During Which Work Performed		
	Aug., 1936	July, 1936	June, 1936
1	57.15	71.17	
2		84.42	
3	53.42	69.72	
4	43.92		
5	46.92		
6	46.92	71.92	
7	40.92	71.92	
8	27.67	71.92	
9		64.22	
10	37.42	64.22	
11	54.70	55.67	
12	7.70		
13	28.42	71.92	
14	21.70	69.42	
15	22.40	63.92	99.67
16		69.42	74.07
17		74.17	88.78
18		58.42	95.80
19			84.28
20		83.42	108.95
21		56.92	
22		69.42	80.00
23		94.00	44.44
24		94.00	65.78
25		72.00	54.67
26			79.14
27		94.30	73.05
28		94.30	
29		94.30	88.92
30		94.30	147.92
31		85.65	
Totals—Measuring Work	489.26	1,965.06	1,185.47

foregoing represent an aggregate of $3,689.79 expended suring work between the 15th day of June, 1936, and h day of August, 1936.

ddition, during this same period of time, the aggregate $51.65 is shown as having been expended for services pleting specifications.

services so indicated may be identified as to the days ch performed, as follows:

July 21, 1936	15.00
July 22, 1936	14.00
July 31, 1936	8.65
August 12, 1936	14.00
Total—Completing Specifications	51.65

Indorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's -113. Filed June 1, 1938. Walter B. Maling, Clerk. By Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT X-114

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA.

Cost of Operations of
t Highway District No. 13 of the State of California
May 25, 1936, to November 30, 1937.

eering Pay Roll—Monthly Roll	$100,340.21
and Legal Pay Roll—Monthly Roll	21,000.50
nance and Watchmen—Weekly Pay Roll	3,745.49
als, Supplies and Expenses	26,372.75
tal Costs of Operations	$151,458.95

(555 Days Included in Above Period)

verage Cost Per Day During Above Period $272.899)

JOINT HIGHWAY DISTRICT NO. 13
OF THE STATE OF CALIFORNIA

Detail of Charges for Services—From Monthly Pay Roll—May 25, 1936 to November 30, 1937

PERIOD COVERED: Engineering Services:	CHECKS ISSUED	Total Monthly Pay Roll	Accounted for Herein	Protection and Maintenance: Watchmen, Etc.	Protection and Maintenance: Engineering Services	Measuring Work	Completing Specifications	Other Exclusions
Year 1936								
May 25 to 31st	1861 - 1889	1,426.75	1,426.75					
Month of June,	1935 & 1936 &							
June,	1965 - 1994	6,608.82	4,135.57	108.36	461.60	1,185.47		717.82
July,	2465 - 2489	6,586.25	2,570.31	690.35	1,322.88	1,965.06	37.65	
August,	2640 - 2663	6,259.25	4,063.27	687.90	1,004.82	489.26	14.00	
September,	2800 - 2819	5,916.75	4,363.87	633.20	919.68			
October,	2943 - 2962	5,951.00	4,804.79	300.00	846.21			
November,	3078 - 3099	5,272.00	5,017.00		255.00			
December,	3142 and							
December,	3156 - 3179	5,475.75	5,475.75					
Year 1937								
Month of January,	3231 - 3254	5,946.25	5,946.25					
February,	3306 - 3329	6,029.75	6,029.75					
March,	3396 - 3420	6,289.00	6,289.00					
April,	3478 - 3504	6,677.20	6,677.20					
May,	3561 - 3589	7,117.15	7,117.15					
June,	3667 - 3692	6,629.50	6,629.50					
July,	3755 - 3780	6,681.25	6,681.25					
August,	3875 - 3897	6,088.00	6,088.00					
September,	3972 - 3991	5,488.00	5,488.00					
October,	4063 - 4085	5,820.30	5,820.30					
November,	3078 - 3099	5,716.50	5,716.50					
Totals		111,979.47	100,340.21	2,419.81	4,810.19	3,639.79	51.65	717.82
Office and Legal Services:								
Year 1936								
May 25 to 31st	1890 - 1894	230.00	230.00					
Month of June,	1995 - 2003	1,178.00	1,178.00					
July,	2490 - 2497	2,573.75	1,150.00					1,423.75
August,	2564 - 2671	2,412.50	1,282.50					1,130.00
September,	2820 - 2827	2,308.75	1,183.75					1,125.00
October,	2963 - 2969	2,277.50	1,142.50					1,135.00
November,	3100 - 3106	2,255.00	1,135.00					1,120.00
December,	3180 - 3186	2,275.00	1,145.00					1,130.00
Year 1937								
Month of January,	3255 - 3261	2,262.50	1,137.50					1,135.00
February,	3230 - 3236	2,247.50	1,132.50					1,115.00
March,	3421 - 3427	2,290.00	1,155.00					1,135.00
April,	3505 - 3511	2,275.00	1,145.00					1,130.00
May,	3590 - 3596	2,272.50	1,142.50					1,130.00
June,	3693 - 3699	2,267.50	1,137.50					1,130.00
July,	3781 - 3787	2,272.50	1,142.50					1,130.00

Year 1937								
Month of	January,	3255 - 3261	2,262.50	1,137.50				1,125.00
	February,	3230 - 3236	2,247.50	1,132.50				1,115.00
	March,	3421 - 3427	2,290.00	1,155.00				1,135.00
	April,	3505 - 3511	2,275.00	1,145.00				1,130.00
	May,	3590 - 3596	2,272.50	1,142.50				1,130.00
	June,	3693 - 3699	2,267.50	1,137.50				1,130.00
	July,	3781 - 3787	2,272.50	1,142.50				1,130.00
	August,	3898 - 3904	2,275.00	1,145.00				1,130.00
	September,	3792 - 3798	2,261.25	1,141.25				1,120.00
	October,	4086 - 4092	2,272.50	1,142.50				1,130.00
	November,	3100 - 3106	2,257.50	1,132.50				1,125.00
Totals			40,464.25	21,000.50				19,463.75

JOINT HIGHWAY DISTRICT #13
OF THE STATE OF CALIFORNIA

Detail of Charges for Services—From Weekly Payroll—
May 25, 1936 to Nov. 30, 1937

DESCRIPTION					
Week Ending	Checks Issued	Total Weekly Payrolls	Accounted For Herein	Protection & Maintenance	Other Included Items
5/30/36	2041 - 2062	$ 318.00			$ 318.00
6/ 6/36	2069 - 2077	308.06			308.06
6/13/36	2079 - 2086	301.08			301.08
6/20/36	2087 - 2095	108.38			108.38
6/20/36	1937 - 1964	578.36		578.36	
6/27/36	2020 - 2050	734.84		734.84	
7/ 4/36	2068 - 2170	2,283.81		2,283.81	
7/11/36	2202 - 2304	2,787.00		2,787.00	
7/18/36	2313 - 2408	2,978.15		2,978.15	
7/25/36	2434 - 2457	1,126.92		1,126.92	
8/ 1/36	2510 - 2531	806.52		806.52	
8/ 8/36	2557 - 2578	814.52		814.52	
8/15/36	2580 - 2600	816.52		816.52	
8/22/36	2601 - 2623	829.12		829.12	
8/29/36	2672 - 2688	676.52		676.52	
9/ 5/36	2714 - 2729	625.34		625.34	
9/12/36	2731 - 2746	631.34		631.34	
9/19/36	2764 - 2779	631.34		631.34	
9/26/36	2785 - 2799	570.84		570.84	
10/ 3/36	2844 - 2862	692.84		692.84	
10/10/36	2873 - 2892	726.44		726.44	
10/17/36	2893 - 2913	720.84		720.84	
10/24/36	2920 - 2936	615.84		615.84	
10/31/36	2970 - 2986	575.45		575.45	
11/ 7/36	3021 - 3036	569.50		569.50	
11/14/36	3037 - 3052	374.60	221.80	152.80	
11/21/36	3059 - 3063	224.00	224.00		
3/27/37	2109 - 2114	92.00			92.00
6/ 5/37	2125 - 2126	60.00			60.00
6/ 5/37	3641 - 3645	72.00	72.00		
6/12/37	3648 - 3647	80.25	80.25		
6/19/37	3654 - 3655	48.00	48.00		
6/26/37	3663 - 3666	70.80	70.80		

DESCRIPTION Week Ending	Checks Issued	Total Weekly Payrolls	Accounted For Herein	Protection & Maintenance	Other Excluded Items
7/ 3/37	3732 - 3733	48.00	48.00		
7/10/37	3739 - 3741	71.00	71.00		
7/17/37	3745 - 3746	48.00	48.00		
7/24/37	3751 - 3752	48.00	48.00		
7/31/37	3796 - 3797	82.40	82.40		
8/ 7/37	3828 - 3832	119.60	119.60		
8/14/37	3839 - 3855	216.19	216.19		
8/21/37	3860 - 3865	164.75	164.75		
8/28/37	3867 - 3869	90.00	90.00		
9/ 4/37	3946 - 3949	97.50	97.50		
9/11/37	3950 - 3954	108.00	108.00		
9/18/37	3957 - 3962	108.50	108.50		
9/25/37	3969 - 3971	96.00	96.00		
10/ 2/37	4020 - 4023	93.00	93.00		
10/ 9/37	4037 - 4039	72.00	72.00		
10/16/37	4043 - 4049	156.00	156.00		
10/23/37	4050 - 4055	252.00	252.00		
10/30/37	4098 - 4103	252.00	252.00		
11/ 6/37	4138 - 4145	281.26	252.00		29.26
11/13/37	4145 - 4159	252.00	252.00		
11/20/37	4165 - 4183	401.70	401.70		
Totals		25,907.12	3,745.49	20,944.85	1,216.78

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	May, 1936, Vouchers				
1085	Herb Dana & Company	Insurance on Instruments	31.97		31.97
1106	Electric Blue Print & Photo Co.	Plumb Bobs	2.06		2.06
1107	F. Bruce Maiden & Co.	Office Rent	100.00		100.00
1111	Wallace B. Boggs	May Expenses	68.20	61.40	6.80
1112	J. W. Barkley	" "	78.73	61.23	17.50
1113	M. C. Collins	" "	23.35	18.70	4.65
1114	John R. Hunter	" "	19.18	16.18	3.00
1115	A. R. Ahlgren	Comptroller's Bond	50.00		50.00
1117	Romaine W. Myers	Services	262.50		262.50
1121	E. H. Frisell	May Expenses	59.80	48.40	11.40
1125	Alhambra Water Company	Water Service	8.75		8.75
1126	Brotherton, Thomas & Co.	Accounting Services	75.00		75.00
1127	H. B. Campbell	May Expenses	16.70	12.00	4.70
1129	R. J. Driggs	" "	10.60	8.40	2.20
1130	George Hammer	" "	28.00	22.00	6.00
1131	L. W. Hunt	" "	24.50	18.80	5.70
1132	H. W. Kay	" "	17.40	14.80	2.60
1133	C. E. Riggs	" "	22.00	17.20	4.80
1135	J. M. Loomer	" "	17.10	12.90	4.20
1136	J. A. Morin	" "	18.00	14.40	3.60

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	June, 1936, Vouchers				
1148	Associated Oil Company	Oil, Gasoline & Kerosene	15.06		15.06
1149	Braun-Knecht-Heiman Co.	Chapman Flask	5.41		5.41
1152	East Bay Mun. Utility Dist.	Water Service	4.09		4.09
1154	E. B. Field Co.	Automobile Insurance	95.49		95.49
1155	Goodyear Glove Rubber Footwear	Rubber Boots	19.27		19.27
1157	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1158	Charles R. Mulgrew	Envelopes	10.30		10.30
1160	Pac. Tel. & Tel. Co.	Telephone Service	78.03		78.03
1161	C. E. Riggs	June Expenses	16.10		16.10
1162	Smith Bros.	Stationery	39.69		39.69
1164	Brotherton, Thomas & Co.	Accounting Services	35.00		35.00
1165	Commercial & Photo View Co.	Prints	97.96		97.96
1166	Dieterich-Post Co.	Blue Prints and Ink	5.26		5.26
1167	East Bay Blue Print & Supply Co.	Blue Print Paper	2.87		2.87
1168	Gilson Electric Supply Co.	Flash Lights, Cells, Flash Lamps	66.78		66.78
1180	State Compensation Insurance Fund	Workmen's Compensation Insurance	476.04	353.61	122.43

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	July, 1936, Vouchers				
1182	Associated Stationers	Install Lock on File Drawer	3.86		3.86
1183	Camera Corner	Films, Finishing, and Kodak Work	13.59		13.59
1188	Romaine W. Myers	Services	385.00		385.00
1189	Pac. Gas & Electric Co.	Light Service	.44		.44
1190	Pac. Tel. & Tel. Co.	Telephone Service	6.78		6.78
1191	Pacific Rotaprinting Co.	Printing 1000 Forms	8.76		8.76
1193	Zellerbach Paper Co.	Towels	3.86		3.86
1194	Wallace B. Boggs	June Expenses	66.33		66.33
1195	J. W. Barkley	" "	75.24		75.24
1196	M. C. Collins	" "	38.15		38.15
	Totals Forwarded		2,618.20	680.02	1,938.18
	Totals Brought Forward		2,618.20	680.02	1,938.18
1197	E. H. Frisell	June Expenses	53.10		53.10
1198	John R. Hunter	" "	62.07		62.07
1200	H. B. Campbell	" "	12.00		12.00

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1201	D. W. Chase	" "	2.00		2.00
1202	A. S. Gelston	" "	23.34		23.34
1203	George Hammer	" "	29.30		29.30
1204	L. W. Hunt	" "	12.80		12.80
1205	John M. Loomer	" "	17.00		17.00
1206	J. A. Morin	" "	18.50		18.50
1207	E. W. Ray	" "	10.40		10.40
1214	R. J. Driggs	" "	5.00		5.00
1220	Campus Text Book Exchange	Quadrille Ruled Paper	20.60		20.60
1222	H. M. Lawrence	Ford Repairs	2.27		2.27
1229	F. Bruce Maiden & Co.	Office Room	115.00		115.00
1231	Pac. Tel. & Tel. Co.	Telephone Service	102.77		102.77
1234	Associated Stationers	Erasers	1.13		1.13
1235	Camera Corner	Finishing, Films	9.83		9.83
1237	East Bay Blue Print & Supply Co.	Plumb Bobs, Level Rod Strip, Paper	9.27		9.27
1238	Les C. Firestine Automobile Repairs	Automobile Repairs	.85		.85
1244	Pac. Tel. & Tel. Co.	Tel. Service	1.97		1.97
1245	Smith Bros.	Stationery and Office Supplies	24.37		24.37

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — **May 25, 1936 to November 30, 1937**

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	August, 1936, Vouchers				
1248	Wallace B. Boggs	July Expenses	23.60		23.60
1249	J. W. Barkley	" "	68.15		68.15
1250	H. B. Campbell	" "	11.40		11.40
1251	D. W. Chase	" "	1.00		1.00
1252	M. C. Collins	" "	23.95		23.95
1253	A. S. Gelston	" "	20.00		20.00
1254	George Hammer	" "	22.50		22.50
1255	L. W. Hunt	" "	15.00		15.00
1256	John R. Hunter	" "	30.89		30.89
1257	John A. Morin	" "	5.60		5.60
1258	J. M. Loomer	" "	12.20		12.20
1260	Wallace B. Boggs	Postage	25.00		25.00
1262	Dietrich-Post Co.	Blue Prints and Paper	5.90		5.90
1268	Romaine W. Myers	Services	350.00		350.00
1278	H. S. Crocker & Co., Inc.	Payroll Sheets	2.58		2.58
1279	C. C. Cook	Repair to Heater	3.00		3.00
1280	R. J. Driggs	July Expenses	1.00		1.00
1281	East Bay Mun. Utility Dist.	Water Service	5.56		5.56

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1282	Gilson Electric Supply Co.	Mazda Bulbs	2.78		2.78
1283	E. Bruce Maiden Co.	Office Room	115.00		115.00
1285	Pac. Tel. & Tel. Co.	Telephone Service	79.93		79.93
1286	Pac. Tel & Tel. Co.	" "	4.85		4.85
1288	East Bay Utility Dist.	Water Service	2.71		2.71
1289	Brotherton, Thomas Co.	Accounting Services	125.00		125.00
1290	Pac. Tel. & Tel. Co.	Telephone Service	6.25		6.25
1291	Associated Oil Co.	Oil and Gasoline	26.84		26.84
1293	Camera Corner	Finishing Films	3.96		3.96
1295	Dietrich-Post Co.	Paper and Sketch Board	7.44		7.44
	Totals Forwarded		4,153.86	680.02	3,473.84
	Totals Brought Forward		4,153.86	680.02	3,473.84
1299	Romaine W. Myers	Services	105.00		105.00
1302	Smith Brothers	Stationery and Office Supplies	74.97		74.97
1303	J. W. Barkley	August Expense	65.70		65.70
1304	M. C. Collins	" "	24.60		24.60
1305	A. S. Gelston	" "	7.25		7.25

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1306	George Hammer	" "	12.70		12.70
1307	John R. Hunter	" "	31.59		31.59
1308	K. C. Pansford	" "	5.20		5.20
1309	Ruth W. Veal	Telephone Service	7.15		7.15
	September, 1936, Vouchers				
1317	East Bay Blue Print & Supply Co.	Paper	2.78		2.78
1321	Pacific Tel. & Tel. Co.	Telephone Service	6.35		6.35
1322	Wallace B. Boggs	August Expense	105.62	63.82	41.80
1327	Inter-City Printing Co.	Printing Contracts	125.97		125.97
1335	Pacific Tel. & Tel. Co.	Telephone Service	141.42		141.42
1337	Associated Oil Company	Oils and Gasoline	33.02		33.02
1339	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1340	John M. Olney	Repairs to Ford	16.82		16.82
1342	Dietereich-Post Co.	Paper and Blue Prints	7.61		7.61
1343	Inter-City Printing Co.	Printing Bidders' Statements	11.64		11.64
1345	Romaine W. Myers	Services	210.00		210.00
1347	Pacific Tel. & Tel. Co.	Telephone Services	5.50		5.50
1348	Zellerbach Paper Co.	Towels	3.86		3.86

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1349	J. W. Barkley	September Expense	64.73		64.73
1350	M. C. Collins	" "	27.80		27.80
1351	John R. Hunter	" "	31.25		31.25
1352	John A. Morin	" "	6.00		6.00
	October, 1936, Vouchers				
1353	Wallace B. Boggs	September Expense	70.81		70.81
1354	A. S. Gelston	" "	6.60		6.60
1355	George Hammer	" "	19.40		19.40
1360	H. M. Lawrence	Ford Repairs	31.26		31.26
1361	Pacific Tel. & Tel. Co.	Telephone Services	5.65		5.65
1364	Gelston Electric Supply Co.	Unit Cells	24.47		24.47
1366	Smith Brothers	Stationery and Office Supplies	24.98		24.98
1369	Inter-City Printing Co.	Printing Contract Blanks	118.45		118.45
1371	Pacific Tel. & Tel. Co.	Telephone Service	79.90		79.90
1375	Alhambra Water Co.	Water and Cups	11.33		11.33
1379	Bruce Maiden & Co.	Office Rent	115.00		115.00
1380	Monroe Calculating Mach. Co.	Repairs to Calculator	12.00		12.00
1384	Associated Oil Company	Gasoline and Oils	38.33		38.33

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1386	Camera Corner	Films and Developing	9.99		9.99
1388	East Bay Blue Print & Supply Co.	Spads	25.96		25.96
1389	Gilson Electrical Supply Co.	Lamp Bulbs	3.71		3.71
	Totals Forwarded		6,001.23	743.84	5,257.39
	Totals Brought Forward		6,001.23	743.84	5,257.39
1390	Harms & Morse	Paper	3.30		3.30
1392	Pacific Tel. & Tel. Co.	Telephone Service	6.10		6.10
1393	Smith Bros.	Stationery, and Office Supplies	25.69		25.69
1395	J. W. Barkley	October Expenses	62.29		62.29
1396	M. C. Collins	" "	22.50		22.50
1397	John R. Hunter	" "	24.17		24.17
1398	A. S. Gelston	" "	4.80		4.80
1400	Romaine W. Myers	Services	210.00		210.00
	November, 1936, Vouchers				
1402	Wallace B. Boggs	October Expenses	26.28		26.28
1403	George Hammer	" "	26.60		26.60

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1405	Pacific Tel. & Tel. Co.	Telephone Service	4.95		4.95
1406	Pacific Rotaprinting Co.	Printing Forms	18.29		18.29
1416	Wallace B. Boggs	Postage	25.00		25.00
1418	Harris & Evey, Inc.	Non-Ownership Auto Ins.	220.72		220.72
1422	Les C. Firestine	Ford Repairs	9.28		9.28
1423	Gilson Electrical Supply Co.	Unit Cells	24.47		24.47
1424	Hercules Equipment & Rubber Co.	Rubber Coats	37.08		37.08
1426	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1427	Pacific Tel. & Tel. Co.	Telephone Service	64.40	29.75	34.65
1429	Associated Oil Co.	Gasoline & Oil	28.67		28.67
1430	State Compensation Ins. Fund	Compensation Insurance	430.00		430.00
1431	Camera Corner	Developing Films	366.00		366.00
1432	Inter-City Co.	Printing Contracts	592.00		592.00
1434	Smith Bros.	Stationery and Office Supplies	35.84		35.84
1437	Wallace B. Boggs	November Expenses	30.50		30.50
1438	J. W. Barkley	" "	56.56		56.56
1439	M. C. Collins	" "	19.50		19.50
1440	John R. Hunter	" "	16.46		16.46
1441	H. B. Campbell	" "	8.40		8.40
1442	A. S. Gelston	" "	5.85		5.85
1445	Romaine W. Myers	Services	280.00		280.00

[illegible]	Romaine W. Myers	Services	280.00		280.00

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	December, 1936, Vouchers				
1448	East Bay Blue Print & Supply Co.	Rules and Tracing Paper	9.09		9.09
1452	George Hammer	November Expenses	29.50		29.50
1455	Pacific Tel. & Tel. Co.	Telephone Services	17.24		17.24
1458	Inter-City Co.	Printing Parts of Contracts	33.42		33.42
1460	Zellerbach Paper Co.	Paper Towels	3.86		3.86
1468	Les C. Firestine	Ford Repairs	8.27		8.27
1469	Pacific Tel. & Tel. Co.	Telephone Service	78.01		78.01
1472	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1475	Railway Express Agency	Express Charges	1.87		1.87
1476	Compton's Electric	Repairs to Heater	3.00		3.00
1477	Pacific Tel. & Tel. Co.	Telephone Services	6.70		6.70
1483	Associated Oil Co.	Gasoline & Oil	39.83		39.83
1484	Wallace B. Boggs	Postage	25.00		25.00
1485	Camera Corner	Finishing Films	5.41		5.41
1487	C. C. Cook	Repairs to Heater	3.00		3.00
	Totals Forwarded		8,232.71	773.59	7,459.12

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	Totals Brought Forward		8,232.71	773.59	7,459.12
1488	Inter-City Printing Co.	Page 1 of Contract	7.42		7.42
1489	Pacific Tel. & Tel. Co.	Telephone Service	8.24		8.24
1493	Romaine W. Myers	Services	175.00		175.00
1495	J. W. Barkley	December Expense	53.74		53.74
1496	M. C. Collins	" "	16.20		16.20
1497	A. S. Gelston	" "	5.30		5.30
1498	George Hammar	" "	28.40		28.40
1499	John R. Hunter	" "	15.41		15.41
1505	East Bay Blue Print & Supply Co.	Paper, Rings and Binders	11.45		11.45
1507	Smith Brothers	Stationery and Office Supplies	19.22		19.22
1508	Wallace B. Boggs	December Expense	59.21		59.21
	January, 1937, Vouchers				
1513	State Compensation Ins. Fund.	Compensation Insurance	1,833.94		1,833.94
1516	Gilson Electrical Supply Co.	Flash Lights and Bulbs	39.96		39.96
1517	Harms and Morse	Paper and Cord	2.32		2.32
1520	Pacific Tel. & Tel. Co.	Telephone Service	68.02		68.02
1521	Ruth W. Veal	Telephone	5.00		5.00

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses

May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1523	Associated Stationers	Stationery	49.96		49.96
1525	Camera Corner	Developing	4.69		4.69
1528	Keelox Manufacturing Co.	Carbon Paper	2.06		2.06
1529	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1531	Pacific Tel. & Tel. Co.	Telephone Service	6.42		6.42
1532	Pacific Tel. & Tel. Co.	Telephone Service	7.00		7.00
1533	Smith Brothers	Stationery	82.50		82.50
1534	Wallace B. Boggs	January Expense	26.25		26.25
1535	J. W. Barkley	" "	57.40		57.40
1536	M. C. Collins	" "	54.45		54.45
1537	E. H. Frisell	" "	27.20		27.20
1538	John R. Hunter	Services	69.89		69.89
1540	Romaine W. Myers	January Expense	350.00		350.00
1547	A. S. Gelston	January Expense	5.46		5.46
1548	H. B. Campbell	January Expense	17.70		17.70
1549	George Hammer		21.50		21.50

JOINT HIGHWAY DISTRICT NO 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	February, 1937, Vouchers				
1556	Braun-Knecht-Heimann Co.	Chapman Flask	5.36		5.36
1557	Compton Electric	Repairs to Heater	3.75		3.75
1559	L. W. Hunt	January Expense	43.15		43.15
1563	John M. Olney	Ford Repairs	69.86		69.86
1566	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1567	Gilsons Electrical Supply Co.	Unit Calls	24.47		24.47
1569	Pacific Tel. & Tel. Co.	Telephone Service	77.65		77.65
1570	Zellerbach Paper Co.	Towels and Paper	7.55		7.55
1575	Associated Oil Company	Gasoline and Oil	35.92		35.92
1576	Camera Corner	Developing	18.07		18.07
1578	Dietereich-Post Co.	Repairing Transit	25.00		25.00
1580	Maxwell Hdwe. Co.	Pails, Brushes, Padlocks	4.01		4.01
1581	Pacific Tel. & Tel. Co.	Telephone Service	13.06		13.06
1582	Smith Brothers	Stationery and Office Supplies	76.53		76.53
	Totals Forwarded		11,998.40	773.59	11,224.81

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	Totals Brought Forward		11,998.40	773.59	11,224.81
1583	J. W. Barkley	February Expense	52.20		52.20
1584	H. B. Campbell	" "	23.10		23.10
1585	M. C. Collins	" "	31.35		31.35
1586	E. H. Frizell	" "	46.20		46.20
1587	A. L. Gelston	" "	24.30		24.30
1588	L. W. Hunt	" "	16.90		16.90
1589	John R. Hunter	" "	21.41		21.41
1590	J. A. Morin	" "	6.40		6.40
1596	George Hammer	" "	25.50		25.50
1598	Henry L. Hinman	Telephone and Expense	45.00		45.00
1600	Romaine W. Myers	Services	420.00		420.00
1603	East Bay Blue Print & Supply Co.	Paper and Ink	5.72		5.72
1604	Wallace B. Boggs	February Expense	59.53		59.53
	March, 1937, Vouchers				
1610	Charles R. Hadley Co.	Stationery	8.09		8.09
1612	Inter-City Printing Co.	Printing	13.39		13.39

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1615	Pacific Tel. & Tel. Co.	Telephone Service	21.53		21.53
1616	Pacific Tel. & Tel. Co.	Telephone Service	87.12		87.12
1618	Alhambra Water Co.	Water Service	8.76		8.76
1619	Associated Oil Company	Gasoline and Oil	6.35		6.35
1620	Wallace B. Boggs	Postage	25.00		25.00
1622	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1623	Gilson Electrical Supply Co.	Lamps	4.33		4.33
1627	Camera Corner	Developing	21.41		21.41
1629	Dietereich-Post Co.	Blue Prints, Level, Paper, Etc.	16.79	3.70	13.09
1631	Romaine W. Myers	Services	595.00		595.00
1632	Pacific Tel. & Tel. Co.	Telephone Service	14.79		14.79
1633	Smith Brothers	Stationery and Office Supplies	14.91		14.91
1634	Wallace B. Boggs	March Expense	26.30		26.30
1635	J. W. Barkeley	" "	66.50		66.50
1636	H. B. Campbell	" "	25.10		25.10
1637	M. C. Collins	" "	44.10		44.10
1638	A. S. Gelston	" "	12.30		12.30

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1639	George Hammer	March Expense	31.10		31.10
1640	John R. Hunter	" "	30.08		30.08
1641	J. A. Morin	" "	15.20		15.20
1642	K. E. Ponsford	" "	6.00		6.00
1643	D. W. Chase	" "	14.20		14.20
1644	L. W. Hunt	" "	20.60		20.60
1645	East Bay Blue Print & Supply Co.	Level Books, Tape Line	21.78		21.78
	April, 1937, Vouchers				
1656	E. H. Frizell	March Expense	68.50		68.50
1657	Harris and Evey, Inc.	Automobile Insurance	70.07		70.07
1660	John M. Olney	Repairs to Ford	9.20		9.20
1663	Les. C. Firestine	Repairs to Ford	6.15		6.15
1664	Harms & Morse, Inc.	Cards and Papers	2.32		2.32
1665	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1667	Pacific Tel. & Tel. Co.	Telephone Service	87.10		87.10
	Totals Forwarded		14,400.08	777.29	13,622.79

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	Totals Brought Forward		14,400.08	777.29	13,622.79
1671	Compton's Electric	Repair to Heater	3.75		3.75
1673	Gilson Electric Supply Co.	Unit Cells	24.47		24.47
1674	Zellerbach Paper Co.	Towels	7.11		7.11
1675	Braun-Knecht-Heiman Co.	Flasks, Plates, Etc.	26.83		26.83
1676	Camera Corner	Developing	3.96		3.96
1677	Maxwell Hardware Co.	Buckets	2.78		2.78
1678	John M. Olney	Repairing Ford	4.55		4.55
1679	Pacific Tel. & Tel. Co.	Telephone Service	16.43		16.43
1680	Smith Brothers	Stationery and Office Supplies	33.41		33.41
1681	Associated Oil Company	Gasoline and Oil	35.91		35.91
1684	Brotherton, Thomas & Company	Accounting Services	175.00		175.00
1687	Dietereich-Post Co.	Blue Prints and Chain Line	17.56	1.24	16.32
1689	J. W. Barkley	April Expense	56.30		56.30
1690	D. W. Chase	" "	17.60		17.60
1691	M. C. Collins	April Expense	40.70		40.70
1692	E. H. Frizell	" "	58.90		58.90
1693	A. S. Gelston	" "	17.70		17.70

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1694	L. W. Hunt	April Expense	49.30		49.30
1695	John R. Hunter	" "	7.05		7.05
1696	J. A. Morin	" "	40.30		40.30
1697	H. B. Campbell	" "	17.50		17.50
1698	George Hammer	" "	28.60		28.60
1701	Romaine W. Myers	Services	490.00		490.00
	May, 1937, Vouchers				
1713	Wallace B. Boggs	April Expense	69.52	42.50	27.02
1714	Braun-Knecht-Heimann Co.	Chapman Flask	5.36		5.36
1719	Pacific Rotaprinting Co.	Printing Forms	72.10		72.10
1722	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1723	Arthur R. Ahlgren	Comptroller's Bond	50.00		50.00
1724	Herb Dana	Surveyor's Instruments Ins.	31.97		31.97
1725	Pacific Tel. & Tel. Co.	Telephone Service	73.00		73.00
1729	Associated Oil Company	Gasoline and Oil	12.43		12.43
1730	Brotherton, Thomas & Company	Accounting Service	75.00		75.00
1733	Herb Dana	Treasurer's Bond	500.00		500.00
1734	Dieterich-Post Co.	Blue Prints, Books, Tape	11.46	.52	10.94

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1735	East Bay Blue Print & Supply Co.	Blue Prints, Level Book	1.83	.72	1.11
1736	Maxwell Hdwe. Co.	Locks, Hammers, Level	14.74		14.74
1737	Pacific Tel. & Tel. Co.	Telephone Service	20.88		20.88
1738	Smith Brothers	Stationery and Office Supplies	57.89		57.89
1740	J. W. Barkley	May Expense	65.20		65.20
1741	D. W. Chase	" "	16.05		16.05
1742	M. C. Collins	" "	29.90		29.90
1743	John B. Hunter	" "	31.88		31.88
1744	J. A. Morin	" "	66.00		66.00
1745	K. E. Ponsford	" "	11.00		11.00
1749	Romaine W. Myers	Services	420.00		420.00
1750	Les. C. Firestine	Repair to Ford	8.61		8.61
1751	Oakland Blue Print Co.	Blue Prints	72.07		72.07
1752	A. S. Gelston	May Expense	28.05		28.05
1753	George Hammer	May Expense	29.70		29.70
	Totals Forwarded		17,465.43	822.27	16,643.16

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	Totals Brought Forward		17,465.43	822.27	16,643.16
1754	E. W. Ray	May Expense	10.30		10.30
1757	Pacific Rotaprinting Co.	Printing	8.45		8.45
1758	Wallace B. Boggs	May Expense	38.30		38.30
1759	E. H. Frisell	" "	69.90		69.90
1760	L. W. Hunt	" "	41.10		41.10
	June, 1937, Vouchers				
1777	Pacific Tel. & Tel. Co.	Telephone Service	83.10		83.10
1778	Les C. Firestine	Repair Ford	2.41		2.41
1780	Associated Stationers	Service Sheets	2.22		2.22
1781	Wallace B. Boggs	Postage	25.00		25.00
1783	E. B. Field Company	Ford Sedan Insurance	92.99		92.99
1784	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1787	Associated Oil Co.	Gasoline and Oil	13.74		13.74
1789	Gilson Electrical Supply Co.	Unit Cells	23.76		23.76
1791	Brotherton Thomas & Co.	Accounting Services	65.00		65.00
1792	Camera Corner	Developing Films	8.29		8.29

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — **May 25, 1936 to November 30, 1937**

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1793	Dieterich-Post Co.	Cross Section Paper	2.58		2.58
1794	Maxwell Hardware Co.	Jars	.81		.81
1795	Romaine W. Myers	Services	560.00		560.00
1797	Pacific Tel. & Tel. Co.	Telephone Service	15.34		15.34
1798	Smith Bros.	Stationery and Office Supplies	17.11		17.11
1799	Ruth W. Veal	Telephone Service	5.00		5.00
1800	Wallace B. Boggs	June Expenses	58.18		58.18
1801	J. W. Barkley	" "	64.40		64.40
1802	Walter B. Berger	" "	11.30		11.30
1803	M. C. Collins	" "	43.80		43.80
1804	George Hammer	" "	30.30		30.30
1805	John R. Hunter	" "	16.65		16.65
1806	K. E. Ponsford	May and June Expenses	9.00		9.00
1807	D. W. Chase	June Expenses	13.15		13.15
1808	A. S. Gelston	" "	22.80		22.80
1809	L. W. Hunt	" "	53.60		53.60
1810	E. W. Ray	" "	8.80		8.80
1812	E. H. Frisell	" "	81.20		81.20

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	July, 1937, Vouchers				
1823	J. A. Morin	June Expenses	49.70		49.70
1827	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1830	Pacific Tel. & Tel. Co.	Telephone Service	69.35		69.35
1833	Associated Oil Co.	Gasoline and Oil	45.54		45.54
1834	Camera Corner	Printing Pictures	3.40		3.40
1836	Dieterich-Post Co.	Field Book	6.18		6.18
1837	East Bay Blue Print and Supply Co.	Draughting Sheets	1.55		1.55
1838	Pacific Tel. & Tel. Co.	Telephone Service	15.80		15.80
1839	Smith Brothers	Stationery and Office Supplies	4.30		4.30
1840	K. E. Ponsford	July Expenses	8.80		8.80
1842	Brotherton, Thomas & Co.	Accounting Services	25.00		25.00
1843	East Bay Blue Print & Supply Co.	Tape Line	13.08		13.08
1845	J. W. Barkley	July Expenses	57.62		57.62
	Totals Forwarded		19,494.33	822.27	18,672.06

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	Totals Brought Forward		19,494.33	822.27	18,672.06
1846	D. W. Chase	July Expense	12.50		12.50
1847	M. C. Collins	" "	31.00		31.00
1848	A. S. Gelston	" "	8.88		8.88
1849	John R. Hunter	" "	26.18		26.18
1850	W. B. Berger	" "	27.50		27.50
1851	L. W. Hunt	" "	39.10		39.10
1852	J. A. Morin	" "	45.10		45.10
1853	Wallace B. Boggs	" "	72.45	58.75	13.70
1854	E. H. Frizell	" "	88.10		88.10
1857	Romaine W. Myers	Services	525.00		525.00
1859	Pacific Rotoprinting Co.	Stationery	17.77		17.77
	August, 1937, Vouchers				
1867	George Hammer	July Expense	26.60		26.60
1868	Harms & Morse	Paper	2.06		2.06
1872	Railway Express Agency	Express	2.06		2.06
1877	Pacific Tel. & Tel. Co.	Telephone Service	77.28		77.28

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1878	Associated Oil Company	Gasoline and Oil	43.12		43.12
1880	J. Bruce Maiden & Co.	Office Rent	115.00		115.00
1881	Pacific Tel. & Tel. Co.	Telephone Service	20.76		20.76
1884	Brotherton, Thomas & Company	Accounting Service	117.50		117.50
1886	Dieterich-Post Co.	Blue Prints and Cloth	14.58	2.22	12.36
1888	Gilson, Electrical Supply Co.	Lamp Bulbs	.68		.68
1889	D. A. Lietz Co.	Shade Glass	.92		.92
1890	Maxwell Hdwe. Co.	Brush Hoods	5.46		5.46
1891	Smith Brothers	Stationery and Office Supplies	7.59		7.59
1892	K. E. Ponsford	August Expense	16.50		16.50
1893	John R. Hunter	" "	8.99		8.99
1894	Wallace B. Boggs	" "	101.80	44.40	57.40
1895	J. W. Barkley	" "	58.40		58.40
1896	A. S. Gelston	" "	7.23		7.23
1897	M. C. Collins	" "	39.60		39.60
1898	George Hammer	" "	26.30		26.30
1899	W. B. Berger	" "	12.60		12.60

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1900	Camera Corner	Developing	8.19		8.19
1903	C. L. Geyman	August Expense	3.80		3.80
1904	E. H. Frizell	" "	43.30		43.30
1905	L. W. Hunt	" "	18.80		18.80
1906	J. A. Morin	" "	45.60		45.60
1909	Romaine W. Myers	Services	560.00		560.00
1911	Pacific Rotoprinting Co.	Printing	7.73		7.73
	September, 1937, Vouchers				
1920	D. W. Chase	August Expense	13.40		13.40
1925	Wallace B. Boggs	Postage	25.00		25.00
1928	Pacific Tel. & Tel. Co.	Telephone Service	81.61		81.61
1930	Associated Oil Company	Gasoline and Oil	12.54		12.54
1931	F. Bruce Maiden Co.	Office Rent	115.00		115.00
1932	Smith Brothers	Stationery and Office Supplies	20.63		20.63
1934	Camera Corner	Developing	4.89		4.89
	Totals Forwarded		22,053.43	927.64	21,125.79

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — **May 25, 1936 to November 30, 1937**

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	Totals Brought Forward		22,053.43	927.64	21,125.79
1937	Gilson Electric Supply Co.	Dry Cells and Unit Cells	22.43		22.43
1938	Romaine W. Myers	Services	595.00		595.00
1940	Pacific Tel. & Tel. Co.	Telephone Service	17.87		17.87
1941	Wallace B. Boggs	September Expenses	72.45	37.25	35.20
1942	J. W. Barkley	" "	62.62		62.62
1943	M. C. Collins	" "	34.85		34.85
1944	K. E. Ponsford	" "	20.00		20.00
1945	George Hammer	" "	56.20		56.20
1946	W. B. Berger	" "	5.80		5.80
1947	John R. Hunter	" "	5.33		5.33
1948	A. S. Gelston	" "	8.25		8.25
1949	J. A. Morin	" "	38.30		38.30
1951	D. W. Chase	" "	3.25		3.25
1952	C. L. Geyman	" "	3.40		3.40

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	October, 1937, Vouchers				
1961	L. W. Hunt	September Expenses	27.40		27.40
1970	Les C. Firestine	Ford Repair	.55		.55
1971	E. H. Frisell	September Expenses	21.00		21.00
1972	F. Bruce Maiden & Co.	Office Rent	115.00		115.00
1973	J. M. Olney	Ford Repair	5.64		5.64
1974	Pacific Tel. & Tel. Co.	Telephone Service	97.69		97.69
1975	Associated Oil Co.	Gasoline and Oil	18.29		18.29
1977	Henry L. Hinman	October Expense	76.00		76.00
1982	East Bay Blue Print and Supply Co.	Rules	3.34		3.34
1983	Pac. Tel. & Tel. Co.	Telephone Services	22.73		22.73
1984	Smith Bros.	Envelopes, Paper	25.91		25.91
1985	K. E. Ponsford	October Expenses	21.70		21.70
1986	John R. Hunter	" "	9.52		9.52
1988	J. W. Barkley	" "	68.39		68.39
1989	M. C. Collins	" "	3.85		3.85
1990	C. L. Geyman	" "	4.00		4.00
1991	Wallace B. Boggs	Postage	25.00		25.00

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
1992	Brotherton, Thomas & Co.	Accounting Services	75.00		75.00
1994	Commercial & Photo View Co.	Prints and Slides	77.47		77.47
1998	Romaine W. Myers	Services	595.00		595.00
2001	W. B. Berger	October Expenses	17.50		17.50
2002	H. B. Campbell	" "	35.70		35.70
2003	D. W. Chase	" "	3.10		3.10
2004	W. K. Guthrie	" "	20.90		20.90
2005	George Hammer	" "	62.30		62.30
2006	L. W. Hunt	" "	39.30		39.30
2007	J. A. Morin	" "	10.90		10.90
	November, 1937, Vouchers				
2019	A. S. Gelston	October Expenses	21.10		21.10
2020	E. H. Frisell	" "	23.30		23.30
2021	Les C. Firestine	Ford Repair	5.52		5.52
2024	Gilson Electric Supply Co.	Unit Cells	13.44		13.44
2030	Les C. Firestine	Ford Repair	5.66		5.66
	Totals Forwarded		24,551.38	964.89	23,586.49

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
	Totals Brought Forward		24,551.38	964.89	23,586.49
2031	East Bay Blue Print & Supply Co.	Scale and Paper	3.34		3.34
2032	Pac. Tel. & Tel. Co.	Telephone Services	91.26		91.26
2032A	Ruth W. Veal	Telephone Service	5.45		5.45
2033	Harris & Evey, Inc.	Non-Ownership Auto Insurance	127.58		127.58
2035	Railway Express Agency	Express	.93		.93
2036	Associated Oil Co.	Gasoline & Oil	27.64		27.64
2037	Camera Corner	Films	8.91		8.91
2039	Les C. Firestine	Ford Repair	16.99		16.99
2040	W. H. Picard Inc.	Repairing Water Line	65.00		65.00
2041	Smith Bros.	Stationery and Office Suplies	10.35		10.35
	December, 1937, Vouchers				
2046	J. W. Barkley	November Expenses	57.40		57.40
2047	M. C. Collins	" "	7.39		7.39
2048	L. W. Hunt	" "	27.40		27.40
2049	J. A. Morin	" "	7.20		7.20
2050	K. E. Ponsford	" "	3.00		3.00
2051	D. W. Chase	" "	4.10		4.10
2052	George Hammer	" "	54.10		54.10

JOINT HIGHWAY DISTRICT NO. 13 OF THE STATE OF CALIFORNIA

Cost of Operations—Materials, Supplies and Expenses — May 25, 1936 to November 30, 1937

Voucher Numbers	Firm to Which Paid	Description of Charges	Total Amount of Vouchers	Charged Elsewhere	Accounted For Herein
2053	W. B. Berger	November Expenses	8.00		8.00
2054	H. B. Campbell	" "	15.00		15.00
2055	E. H. Frisell	" "	17.60		17.60
2056	John R. Hunter	" "	13.97		13.97
2062	Pacific Rotaprinting Co.	Printing Forms	33.45		33.45
2063	Pac. Tel. & Tel. Co.	Telephone Service	14.78		14.78
2064	Wallace B. Boggs	November Expenses	78.00		78.00
2065	A. S. Gelston	" "	19.30		19.30
2069	Alhambra Water Co.	Water Service	6.18		6.18
2070	Pacific Tel. & Tel. Co.	Telephone Service	11.85		11.85
2102	State Compensation Insurance Fund	Workmen's Compensation Insurance	2,072.08	91.14	1,980.94
2105	Pacific Tel. & Tel. Co.	Telephone Service	17.62		17.62
2115	Associated Oil Co.	Gasoline & Oil	30.74	16.44	14.30
	January, 1938, Vouchers				
2142	John M. Olney	Ford Repair (September bill)	37.23		37.23
	Totals		27,445.22	1,072.47	26,372.75

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. X-114. Filed June 1, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.

DEFENDANT'S EXHIBIT X-116.

State of California,
County of Contra Costa—ss.

I, S. C. Wells, County Clerk of the County of Contra Costa, and Ex-Officio Clerk of the Board of Supervisors of the County of Contra Costa, State of California, do hereby certify that the annexed is a full, true and correct copy of a certified copy of a resolution of the Board of Directors of Joint Highway District No. 13 of the State of California, which was delivered to and filed with the Board of Supervisors of the County of Contra Costa, State of California, on the 2nd day of December, 1937, and that the same is now on file with such Board of Supervisors, and a part of the records of said Board.

Dated, this 2nd day of December, 1937.

[Seal of Board of Supervisors]

S. C. WELLS,
County Clerk and Ex-Officio Clerk of the Board of Supervisors of the County of Contra Costa, State of California.

I, Harry N. Stow, Secretary of Joint Highway District No. 13 of the State of California, hereby certify that the annexed is a full, true and correct copy of the Certificate and Receipt of S. C. Wells, County Clerk of the County of Contra Costa, and ex-officio Clerk of the Board of Supervisors of the

County of Contra Costa, State of California, filed in the records of this District on the 2nd day of December, 1937.

HARRY M. STOW,
Secretary, Joint Highway District No. 13 of the State of California.

[Seal] By B. V. RIORDAN,
Assistant Secretary.

RESOLUTION OF BOARD OF DIRECTORS OF JOINT HIGHWAY DISTRICT No. 13 OF THE STATE OF CALIFORNIA, THAT PROJECT IS COMPLETED; ADOPTED UNDER THE PROVISIONS OF SECTION 32 OF THE "JOINT HIGHWAY DISTRICT ACT."

"Whereas, on the 29th day of November, 1937, Wallace B. Boggs, District Engineer, made and furnished to the Director of Public Works of the State of California, an affidavit and certificate, in writing, showing that the highway, highway tunnels and appurtenances constituting the project of this District, had been constructed, improved and completed in accordance with the plans and specifications and supplements thereto previously adopted therefor; and

Whereas, on the 30th day of November, 1937, the Director of Public Works of the State of California issued and made his certificate, in writing, showing

that the said highway, highway tunnels and appurtenances constituting the project of this District had been duly constructed, improved and completed in accordance with the plans and specifications previously adopted therefor, which said certificate is now on file in the records of this District;

It is hereby resolved that the Board of Directors of Joint Highway District No. 13 of the State of California hereby declare that the project of said Joint Highway District has been duly constructed, improved and completed in accordance with the plans and specifications therefor adopted on the 30th day of March, 1933, and the amendments and supplements thereto adopted on the 9th day of January, 1934, the 3rd day of April, 1934, and the 23rd day of September, 1936, made by Wallace B. Boggs, District Engineer, and now on file in the office of said Joint Highway District, and that the said highway, highway tunnels and appurtenances are now complete and ready for use by the public;

It is hereby further resolved that the secretary or assistant secretary prepare certified copies of this resolution and transmit the same to Earl Lee Kelly, Director of Public Works of the State of California, and to the Boards of Supervisors of the Counties of Alameda and Contra Costa, which said counties comprise the counties within said Joint Highway District."

I, Harry M. Stow, Secretary of Joint Highway District No. 13 of the State of California, hereby certify that the foregoing is a full, true and correct

copy of a resolution adopted by the unanimous vote of all of the members of the Board of Directors of Joint Highway District No. 13 of the State of California, at a regular meeting of said Board of Directors held on the 1st day of December, 1937.

[Seal] HARRY M. STOW,
Secretary, Joint Highway District No. 13 of the State of California.
By B. V. RIORDAN,
Assistant Secretary.

[Endorsed]: Filed December 2, 1937. Harry M. Stow, Secretary, Joint Highway District No. 13 of the State of California. By B. V. Riordan, Assistant Secretary.

State of California,
County of Alameda—ss.

I, G. E. Wade, County Clerk of the County of Alameda, and Ex-Officio Clerk of the Board of Supervisors of the County of Alameda, State of California, do hereby certify that the annexed is a full, true and correct copy of a certified copy of a resolution of the Board of Directors of Joint Highway District No. 13 of the State of California, which was delivered to and filed with the Board of Supervisors of the County of Alameda, State of California, on the 2nd day of December, 1937, and that

the same is now on file with such Board of Supervisors, and a part of the records of said Board.

Dated, this 2nd day of December, 1937.

G. E. WADE,
County Clerk and Ex-Officio Clerk of the Board of Supervisors of the County of Alameda, State of California,
By J. C. HOLLAND,
Deputy.

[Seal of Board of Supervisors]

I, Harry M. Stow, Secretary of Joint Highway District No. 13 of the State of California, hereby certify that the annexed is a full, true and correct copy of the Certificate and Receipt of G. E. Wade, County Clerk of the County of Alameda, and ex-officio Clerk of the Board of Supervisors of the County of Alameda, State of California, filed in the records of this District on the 2nd day of December, 1937.

HARRY M. STOW,
Secretary,
Joint Highway District No. 13 of the State of California,
[Seal] By B. V. RIORDAN,
Assistant Secretary.

RESOLUTION OF BOARD OF DIRECTORS OF JOINT HIGHWAY DISTRICT No. 13 OF THE STATE OF CALIFORNIA; THAT PROJECT IS COMPLETED; ADOPTED UNDER THE PROVISIONS OF SECTION 32 OF THE "JOINT HIGHWAY DISTRICT ACT."

"Whereas, on the 29th day of November, 1937, Wallace B. Boggs, District Engineer, made and furnished to the Director of Public Works of the State of California, an affidavit and certificate, in writing, showing that the highway, highway tunnels and appurtenances constituting the project of this District, had been constructed, improved and completed in accordance with the plans and specifications and supplements thereto previously adopted therefor; and

Whereas, on the 30th day of November, 1937, the Director of Public Works of the State of California issued and made his certificate, in writing, showing that the said highway, highway tunnels and appurtenances constituting the project of this District had been duly constructed, improved and completed in accordance with the plans and specifications previously adopted therefor, which said certificate is now on file in the records of this District;

It Is Hereby Resolved that the Board of Directors of Joint Highway District No. 13 of the State of California hereby declare that the project of said Joint Highway District has been duly constructed, improved and completed in accordance with the

plans and specifications therefor adopted on the 30th day of March, 1933, and the amendments and supplements thereto adopted on the 9th day of January, 1934, the 3rd day of April, 1934, and the 23rd day of September, 1936, made by Wallace B. Boggs, District Engineer, and now on file in the office of said Joint Highway District, and that the said highway, highway tunnels and appurtenances are now complete and ready for use by the public;

It Is Hereby Resolved that the secretary or assistant secretary prepare certified copies of this resolution and transmit the same to Earl Lee Kelly, Director of Public Works of the State of California, and to the Boards of Supervisors of the Counties of Alameda and Contra Costa, which said counties comprise the counties within said Joint Highway District."

I, Harry M. Stow, Secretary of Joint Highway District No. 13 of the State of California, hereby certify that the foregoing is a full, true and correct copy of a resolution adopted by the unanimous vote of all of the members of the Board of Directors of Joint Highway District No. 13 of the State of California, at a regular meeting of said Board of Directors held on the 1st day of December, 1937.

HARRY M. STOW,
Secretary,
Joint Highway District No. 13 of the State of California,

[Seal] By B. V. RIORDAN,
Assistant Secretary.

RESOLUTION OF BOARD OF DIRECTORS OF JOINT HIGHWAY DISTRICT No. 13 OF THE STATE OF CALIFORNIA, THAT PROJECT IS COMPLETED; ADOPTED UNDER THE PROVISIONS OF SECTION 32 OF THE "JOINT HIGHWAY DISTRICT ACT."

"Whereas, on the 29th day of November, 1937, Wallace B. Boggs, District Engineer, made and furnished to the Director of Public Works of the State of California, an affidavit and certificate, in writing, showing that the highway, highway tunnels and appurtenances constituting the project of this District, had been constructed, improved and completed in accordance with the plans and specifications and supplements thereto previously adopted therefor; and

Whereas, on the 30th day of November, 1937, the Director of Public Works of the State of California issued and made his certificate, in writing, showing that the said highway, highway tunnels and appurtenances constituting the project of this District had been duly constructed, improved and completed in accordance with the plans and specifications previously adopted therefor, which said certificate is now on file in the records of this District;

It Is Hereby Resolved that the Board of Directors of Joint Highway District No. 13 of the State of California hereby declare that the project of said Joint Highway District has been duly constructed, improved and completed in accordance with the

plans and specifications therefor adopted on the 30th day of March, 1933, and the amendments and supplements thereto adopted on the 9th day of January, 1934, the 3rd day of April, 1934, and the 23rd day of September, 1936, made by Wallace B. Boggs, District Engineer, and now on file in the office of said Joint Highway District, and that the said highway, highway tunnels and appurtenances are now complete and ready for use by the public;

It Is Hereby Further Resolved that the secretary or assistant secretary prepare certified copies of this resolution and transmit the same to Earl Lee Kelly, Director of Public Works of the State of California, and to the Boards of Supervisors of the Counties of Alameda and Contra Costa, which said counties comprise the counties within said Joint Highway District."

I, Harry M. Stow, Secretary of Joint Highway District No. 13 of the State of California, hereby certify that the foregoing is a full, true and correct copy of a resolution adopted by the unanimous vote of all of the members of the Board of Directors of Joint Highway District No. 13 of the State of California, at a regular meeting of said Board of Directors held on the 1st day of December, 1937.

HARRY M. STOW,
Secretary,
Joint Highway District No. 13 of the State of California,
[Seal] By B. V. RIORDAN,
Assistant Secretary.

AFFIDAVIT AND CERTIFICATE OF DISTRICT ENGINEER THAT JOINT HIGHWAY DISTRICT PROJECT IS COMPLETE.

State of California,
County of Alameda—ss.

Wallace B. Boggs, being first duly sworn, deposes and says and certifies:

That at all times mentioned herein he was, and now is, the duly appointed, qualified and acting District Engineer of Joint Highway District No. 13 of the State of California;

That the project of said District, which includes a highway, highway tunnels and approaches with appurtenant structures, located partly in the City of Oakland, County of Alameda, State of California, and partly in the County of Contra Costa, State of California, all in said Joint Highway District No. 13 of the State of California, the westerly terminus of said project being located at a point near the intersection of Broadway with Keith Avenue in the said City of Oakland and the easterly terminus of said project being located at a point on the State Highway in Contra Costa County, approximately fourteen hundred feet northerly from the intersection of the Fish Ranch Road with said State Highway, which is commonly known as and called the "Tunnel Road", has been duly constructed, improved and completed in strict accordance with the plans and specifications therefor adopted by the Board of

Directors of said Joint Highway District on the 30th day of March, 1933, and the amendments and supplements to said specifications adopted by the Board of Directors of said District on the 9th day of January, 1934, on the 3rd day of April, 1934, and the 23rd day of September, 1936, all of which said plans and specifications and supplements thereto were approved by the Director of Public Works of the State of California;

That this affidavit and certificate of the undersigned as District Engineer of said Joint Highway District, is made for the purpose of securing a certificate, under the provisions of Section 32 of the Joint Highway District Act of 1931 (Stats. 1931, page 1026), and of a resolution of the State Highway Commission of the State of California adopted July 8, 1933, approving an additional contribution of $400,000 to the cost of the project of said District by the State of California, from the Director of Public Works of the State of California, showing that the project of the District, which has been completed as aforesaid, has been duly constructed, improved and completed in accordance with the plans and specifications previously adopted therefor.

WALLACE B. BOGGS,

Subscribed and sworn to before me this 29th day of November, 1937.

[Notarial Seal] C. E. PAUL,

Notary Public in and for the County of Alameda, State of California.

My Commission expires Oct. 31, 1941.

[Endorsed]: Filed November 29, 1937. Harry M. Stow, Secretary, Joint Highway District No. 13 of the State of California. By B. V. Riordan, Assistant Secretary.

[Endorsed]: U. S. Dist. Ct. N. D. Cal. No. 20101-R. Deft's Ex. No. X-116. Filed June 2, 1938. Walter B. Maling, Clerk. By J. A. Schaertzer, Deputy Clerk.